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Argonne National Laboratory

APPLIED MATHEMATICS DIVISION SUMMARY REPORT

July 1, 1961 through June 30, 1962

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Development Report

ARGONNE NATIONAL LABORATORY
9700 South Cass Avenue
Argonne, Illinois

APPLIED MATHEMATICS DIVISION SUMMARY REPORT

July 1, 1961 through June 30, 1962

William F. Miller, Division Director

Preceding Summary Reports:

ANL-6453	July 1, 1960 through June 30, 1961
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PREFACE

The objective of the Applied Mathematics Division is to provide mathematical support for the research and development programs of the Laboratory. This goal is achieved, in particular, by (1) conducting research in applied mathematics, theory, and practice of computation, and design of computers and information-processing equipment, (2) providing mathematical consultation, and (3) operating a computational service, using both digital and analog machines. The Division is prepared to provide mathematical assistance at any stage of the development of a problem, from its initial formulation to its final solution.

The Consultation and Research Section is available to assist Laboratory personnel in mathematical consultation, problem formulation, selection of appropriate mathematical and numerical techniques, and to carry out analyses of problems. The Applied Programming Section is specifically set up to program digital computing problems for members of other Divisions. The members of this Section generally work from a problem description provided either by the problem originator or jointly by the problem originator and a member of the Consultation and Research Section. In addition, this Section also performs hand computations that arise and provides production services for machine programs.

It is the responsibility of the Programming Development Section to conduct research and development in new programming techniques, to develop needed subroutines, and to provide training courses and instruction in programming techniques for the benefit of members of the Division, as well as of other Laboratory personnel. The Digital Operations Group prepares machine-input data, schedules machine time, and operates the digital machines. The Analog Group is prepared to assist in the formulation, programming, and running of problems for the analog computer or to accept the problem and carry out these services entirely within the Group.

The function of the Computer Engineering Section is the design and development of computers and information processing devices which have specific application in the nuclear sciences.

APPLIED MATHEMATICS DIVISION

ORGANIZATION CHART
July 1, 1961 through June 30, 1962

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S. Zawadzki

Clerical:
D. Boe
H. M. Glen
S. Katilavas
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ORGANIZATION CHART (Cont'd.)

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*L. Brown
J. A. Byram
*C. H. Conley
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H. L. Gray
J. R. Haasl
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D. Hodges
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V. V. Tantillo
R. H. Vonderohe
R. H. Wehman
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E. A. Fearnow
C. D. Freeman
D. P. Griffin
D. W. Halford
D. G. Hatcher
R. H. Ivan
C. J. Kilty
R. A. Liesemer (T)
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K. Miller (T)
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P. C. Tonne (T)
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E. S. Wiener
P. Zaleski

ANALOG PROBLEM ANALYSIS - PROGRAMMING AND MACHINE OPERATIONS GROUP - N. F. Morehouse, Gr. Ldr.

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L. T. Bryant
L. C. Just
F. J. Maletich
J. H. McAllister (T)
W. E. Scott

CONSULTANTS:

G. Birkhoff, Harvard Univ.
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B. Friedman, Univ. of California
K. O. Friedrichs, New York Univ.
J. W. Givens, Northwestern Univ.
M. Golomb, Purdue Univ.
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B. H. McCormick, Univ. of Illinois
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M. Rotenberg, Univ. of Calif., San Diego
J. N. Snyder, Univ. of Illinois
C. H. Wilcox, Univ. of Wisconsin
H. S. Wilf, Univ. of Illinois

*Co-op Students (T) - Temporary Appointments

COMPUTER PROGRAMS

The listing which follows contains a summary of each computer program initiated during the report period together with code symbols indicating the extent to which information concerning the program is readily available. In addition, programs previously reported are included if during this reporting period changes were made or additional information concerning them was placed in the program library.

Each summary contains, in order, a job number, program identification number and title, the requestor's name and division affiliation, the consultant's and programmer's names (if different), a brief description of the program and a final line encoded to indicate the machine for which the program was prepared, references applicable to the program, the status of library information concerning the program, and its mathematical classification. This final line uses the abbreviations 704, 620, 401, GEO, and ANA to refer to the computer (IBM 704, 1620, 1401, GEORGE, or PACE Analog, respectively) for which the program was developed. The file codes: A, P, S, B, G, and O are used to indicate the library information available and may be interpreted as follows:

A - mathematical analysis effort,
P - programming effort,
S - symbolic or source or program listing,
B - binary or source deck or tape,
G - GEORGE tape, and
O - operating instructions.

Following the file code symbols the AMD program library classification code, if any, appears. The classification codes used currently are:

C. Polynomials and Special Functions

1. Evaluation of Polynomials
2. Roots of Polynomials
3. Evaluation of Special Functions
4. Simultaneous Nonlinear Algebraic Equations
5. Simultaneous Transcendental Equations

D. Operations on Functions and Solutions of Differential Equations

1. Numerical Integration
2. Numerical Solutions of Ordinary Differential Equations
3. Numerical Solutions of Partial Differential Equations
4. Numerical Differentiation

E. Interpolation and Approximations

1. Table Look-up and Interpolation
2. Curve Fitting
3. Smoothing

F. Operations on Matrices, Vectors, and Simultaneous Linear Equations

1. Matrix Operations
2. Eigenvalues and Eigenvectors
3. Determinants
4. Simultaneous Linear Equations

G. Statistical Analysis and Probability

1. Data Reduction: is interpreted as the calculation of the more common statistical parameters such as mean, median, and standard deviation.
2. Correlation and Regression Analysis: includes curve fitting which is explicitly for statistical purposes.
3. Sequential Analysis
4. Analysis of Variance
5. Random Number Generators
6. Monte Carlo Problems

H. Operations Research and Linear Programming

M. Information Processing

1. Sorting
2. Report Preparation
3. Checking of Experimental Recording

R. Geometry

1. Pattern Recognition

S. Machine Design

T. Automata Studies

U. Number Theory

Z. All Others: contains all programs for which no primary class has been selected. Programs which seem to be included in a primary class but which are not adequately described by a subclass are assigned the subclass designation of zero within the applicable primary classification.

506 EL102 MONTE CARLO OF SCINTILLATOR LIGHT COLLECTION

REQUESTOR S. BAKER ELECTRONICS

PROGRAMMER L. KASSEL

MONTE CARLO OF VARIANCE IN PATH LENGTH AND NUMBER OF DIFFUSE REFLECTIONS OF LIGHT RAYS IN SCINTILLATION RADIATION DETECTORS.

GEO REFERENCES FILE CODES S

619 PHY141 LEAST SQUARES FITTING OF RADIOACTIVE DECAY DATA

REQUESTOR G. PERLOW PHYSICS

PROGRAMMER B. GARBOW

COUNTING DATA IS FITTED TO A SERIES OF EXPONENTIALS, WITH THE COEFFICIENTS OF THE SERIES AND THE DECAY RATES DETERMINED.

704F REFERENCES ANL5990,ANZ013 FILE CODES PSB 0 E2
GEO REFERENCES ANL5990 FILE CODES APS G0 E2

760 RPY115 RADON REGRESSION STUDY

REQUESTOR H. MOSES RADIOLOGICAL PHYSICS

PROGRAMMER F. TARABA

AN EXTENSION OF 760/RPY115 TO PERMIT STEP-WISE MULTIPLE REGRESSION STUDIES UPON METEOROLOGICAL VARIABLES TAKEN FROM BASIC PROFILE DECK 71 OR VARIABLES COMPUTED THEREFROM. UNIVARIATE AND BIVARIATE FREQUENCY DISTRIBUTIONS OF RADON CONCENTRATION FOR VARIOUS COMBINATIONS OF VARIABLES ARE ALSO COMPUTED.

704 REFERENCES 947/RPY119 FILE CODES PSB 0 G2

767 PHY171 FLUCTUATIONS IN THE RADIATION WIDTH PRODUCED BY A PORTER-THOMAS DISTRIBUTION OF PARTIAL WIDTHS

REQUESTOR R. CARPENTER PHYSICS

PROGRAMMER D. CARSON

THIS PROBLEM WAS REVISED TO MAKE POSSIBLE THE CALCULATION OF FLUCTUATIONS IN THE RADIATION WIDTH PRODUCED BY A PORTER-THOMAS DISTRIBUTION OF PARTIAL WIDTHS USING (Q-E(N))**L AND (Q-E(N))**2L WITH L=3,4 OR 5, INSTEAD OF (Q-E(N))**3 AND (Q-E(N))**6.

GEO REFERENCES FILE CODES APS G0 Z0

947 RPY119 METEOROLOGICAL RADON STUDIES

REQUESTORS J. PEARSON, H. MOSES RADIOLOGICAL PHYSICS

PROGRAMMER F. TARABA

VARIOUS MATHEMATICAL RELATIONSHIPS WERE ASSUMED BETWEEN THE METEOROLOGICAL VARIABLES OF WIND SPEED, AIR TEMPERATURE, RADON CONCENTRATION AND ELEVATION AND A LEAST SQUARES PROCEDURE WAS USED TO DETERMINE THE PARAMETERS OF DEACON, MONIN AND OBUKHOV, AND SWINBANK. THE CALCULATIONS WERE BASED ON DATA CONTAINED IN BASIC PROFILE DECK 71.

704F REFERENCES FILE CODES PSB 0 E2

1153 PHY224 MELKANOFF OPTICAL MODEL CODE (UCLA)

REQUESTOR J. SCHIFFER PHYSICS

PROGRAMMER S. ZAWADZKI

THIS IS THE MELKANOFF OPTICAL MODEL CODE, SCAT IV, FOR ELASTIC SCATTERING ANALYSES, WHICH HAS BEEN ADAPTED FOR ANL USE.

704F REFERENCES UCLA P.A.COMP.1 FILE CODES 0 D2

1197 PHY225 SOLUTION OF HARTREE EQUATIONS FOR ALKALIS

REQUESTOR J. BERKOWITZ PHYSICS

CONSULTANT W. CODY PROGRAMMER R. JULKE

CALCULATION OF THE HARTREE SCF RADIAL WAVE FUNCTION AND R BAR SQUARED FOR THE SERIES ELECTRON FOR LI, NA, K, RB, AND CS. A VERSION OF 799/PHY176 IS USED.

GEC REFERENCES FILE CODES D2,D1

1209 MET135 D-SPACE

REQUESTOR M. MUELLER METALLURGY

PROGRAMMER S. JANOUSEK

D-SPACE GENERATES INDICES (H, K, L), TESTS FOR THE SPACE-GROUP EXTINCTIONS, AND CALCULATES D, THETA, 2 THETA AND VARIOUS TRIGONOMETRIC FUNCTIONS OF THETA AND LAMBDA FOR ANY CRYSTAL SYSTEM.

IN ADDITION TO THE ORIGINAL CALCULATIONS, D-SPACE HAS BEEN EXPANDED TO DO THE FOLLOWING OPTIONAL CALCULATIONS -

1. SINGLE CRYSTAL ANGLE SETTINGS, PHI AND PSI.
2. VARIOUS LORENTZ AND LORENTZ-POLARIZATION CORRECTIONS.

704F REFERENCES ANL6519 FILE CODES PSB 0 Z0

1212 BIM104

REQUESTOR S. TYLER BIOLOGICAL AND MEDICAL RESEARCH

PROGRAMMER S. JANOUSEK

GIVEN A SET OF RADIOACTIVE DECAY COUNT DATA, COMPUTE THE INITIAL PROPORTIONS OF UP TO 10 RADIOACTIVE MATERIALS IN A MIXTURE BY A LEAST SQUARES PROCEDURE.

704F REFERENCES ANF402 FILE CODES PSB 0 E2

1221 IINSE ANALOG COMPUTER TECHNIQUES

REQUESTOR J. BAIRD INTERNATIONAL INSTITUTE

PROGRAMMER L. BRYANT

A LABORATORY COURSE IN ANALOG TECHNIQUES, APPLIED TO XENON-IODINE EQUATIONS, NON-LINEAR REACTOR KINETICS (ZERO-POWER BARE REACTOR), AND REACTOR KINETICS WITH FEEDBACK.

ANA REFERENCES ANL6187 FILE CODES

1226 SSS120 TWO-CENTER KINETIC ENERGY INTEGRALS FOR RHO SIGMA ORBITALS

REQUESTOR T. GILBERT SOLID STATE SCIENCE

PROGRAMMER A. STRECOK

THIS PROGRAM EVALUATES THE SUM OF TWO DOUBLE INTEGRALS EXPRESSED IN CLOSED ANALYTICAL FORM.

704F REFERENCES FILE CODES APSB 0 D1

1227 IINSE INTRODUCTION TO ANALOG COMPUTING AND THE ANALOG SOLUTION OF THE REACTOR KINETICS EQUATIONS

REQUESTOR J. BAIRD INTERNATIONAL INSTITUTE

PROGRAMMERS L. BRYANT, L. JUST

A SERIES OF LABORATORIES TO PROVIDE INSTRUCTION TO INTERNATIONAL INSTITUTE PARTICIPANTS, ON THE TECHNIQUES AND APPLICATION OF ANALOG COMPUTERS.

ANA REFERENCES ANL6187,ANL6319 FILE CODES

1230 RE HEAT TRANSFER IN AN ANNULUS

REQUESTOR R. VISKANTA REACTOR ENGINEERING

CONSULTANT N. MOREHOUSE PROGRAMMERS L. JUST, F. MALETICH

SOLUTION OF EQUATIONS DESCRIBING HEAT TRANSFER WITH LAMINAR FLOW IN CONCENTRIC ANNULI WITH CONSTANT AND ARBITRARY VARIABLE AXIAL WALL TEMPERATURE.

ANA REFERENCES ANL6441 FILE CODES

1235 RE START UP TRANSIENT SIMULATION FOR EBWR

REQUESTOR N. SUDA REACTOR ENGINEERING

PROGRAMMER L. BRYANT

PARAMETER STUDY OF ENERGY DEPENDENT SHUTDOWN EFFECTS IN EBWR.

ANA REFERENCES FILE CODES

1236 CHM142

REQUESTOR K. SANE CHEMISTRY

PROGRAMMER A. STRECOK

AN INTEGRAL INVOLVING THE COMPOSITE OF NINE GAUSSIAN TYPE CURVES IS EVALUATED.

704F REFERENCES FILE CODES APSB 0 D1

1237 PHY228 CHOPPER TAPE PROCESSOR

REQUESTOR L. BOLLINGER PHYSICS

PROGRAMMER S. ZAWADZKI

THIS PROGRAM EXTRACTS PERTINENT INFORMATION FROM CHOPPER TAPES PREPARED IN A VARIETY OF FORMATS, ORGANIZES AND PROCESSES THIS INFORMATION INTO THE INPUT FORM REQUIRED FOR THE PHY 48 CODE AND RELATED PROGRAMS.

GEO REFERENCES FILE CODES Z0

1238 IINSE PARAMETRIC STUDY OF A HEAVY WATER, CARBON-DIOXIDE COOLED, URANIUM CARBIDE FUELED REACTOR UTILIZING PLUTONIUM RECYCLE

REQUESTOR J. WEILLS INTERNATIONAL INSTITUTE

CONSULTANT N. MOREHOUSE PROGRAMMER L. JUST

DETERMINE THE REACTIVITY LIFETIME OF THIS POWER REACTOR. BALANCE NEUTRON YIELD WITH REACTOR CROSS SECTIONS AS A FUNCTION OF IRRADIATION.

PARAMETERS TO BE VARIED ARE - REACTOR RADIUS, LATTICE PITCH, PRESSURE TUBE THICKNESS, AND RESONANCE ESCAPE PROBABILITY.

ANA REFERENCES FILE CODES

1239 IINSE RADIAL TEMPERATURE FIELD IN AN ELECTRICALLY HEATED ROD

REQUESTOR D. MILLER INTERNATIONAL INSTITUTE

PROGRAMMER L. JUST

ANA REFERENCES FILE CODES

1242 HEP108 SPARK CHAMBER TRACK ANALYSIS

REQUESTOR S. WARSAW HIGH ENERGY PHYSICS

PROGRAMMER W. SNOW

FROM PARTICLE TRACKS IN A SPARK CHAMBER, VECTOR MOMENTA AND OTHER ASSOCIATED QUANTITIES ARE TO BE OBTAINED. THE DATA WILL BE SUPPLIED IN DIGITIZED RECTANGULAR COORDINATES FROM TWO STEREO FILM VIEWS. THE POINTS OF THE TRACK WILL BE RECONSTRUCTED IN SPACE AND A HELIX FITTED TO THEM. KINEMATIC ANALYSIS WILL THEN BE CONSIDERED.

THE PROGRAM IS INTENDED TO RUN ON THE 709 AT CERN.

704F REFERENCES 638/HE(PHY146) FILE CODES E2
GEO REFERENCES 638/HE(PHY146) FILE CODES E2

1243 HEP109 DETECTION EFFICIENCY FOR K-MESONIC DECAYS

REQUESTOR G. BURLESON HIGH ENERGY PHYSICS

PROGRAMMER M. WELCH

A MONTE CARLO CALCULATION OF THE DETECTION EFFICIENCY, INCLUDING THE PROBABILITY OF PAIR PRODUCTION, OF A SPARK CHAMBER ARRAY FOR THREE DECAYS OF THE POSITIVE K MESON. THE EFFICIENCY IS A FUNCTION OF THE ENERGIES OF THE UNCHARGED PION AND OF THE CHARGED PARTICLE.
OPTION, THE EFFICIENCY FOR A POINT ISOTROPIC SOURCE OF MONO-ENERGETIC UNCHARGED PIONS.
A SECOND PROGRAM, HEP109W IS SIMILAR TO THE ABOVE OPTION EXCEPT FOR A GEOMETRICAL MODIFICATION OF THE DETECTOR.

704F REFERENCES ANG502 FILE CODES APSB 0 G6

1252 IINSE ANALOG COMPUTER INSTRUCTION

REQUESTOR J. BAIRD INTERNATIONAL INSTITUTE

PROGRAMMER L. JUST

A LABORATORY COURSE IN ANALOG TECHNIQUES APPLIED TO XENON-IODINE EQUATIONS. NON-LINEAR REACTOR KINETICS AND REACTOR KINETICS WITH FEEDBACK. THE EXPERIMENTS ARE TO PROVIDE INSTRUCTION FOR REACTOR SUPERVISOR TRAINEES.

ANA REFERENCES FILE CODES

1253 PHY229

REQUESTOR J. SCHIFFER PHYSICS

CONSULTANT J. BUTLER PROGRAMMER D. JORDAN

FITTING OF EXPERIMENTAL DATA GIVEN AT 400 POINTS TO A SUM OF EXPONENTIAL BACKGROUND AND GAUSSIAN LINE SHAPE FUNCTIONS. TWO METHODS ARE USED - A) THE VARIABLE METRIC MINIMIZATION PROCEDURE AND B) THE DIRECT SEARCH TECHNIQUE.

704F REFERENCES JACM,8,2,4/61,ANZ0133 FILE CODES PSB 0 E2

1254 PHY230 LEGENDRE POLYNOMIAL FIT

REQUESTOR J. SCHIFFER PHYSICS

PROGRAMMER B. GARROW

DATA IS FITTED TO A SERIES OF LEGENDRE POLYNOMIALS AFTER POSSIBLE CONVERSION FROM LABORATORY TO CENTER OF MASS SYSTEM.

620F REFERENCES FILE CODES PSB 0 E2

1255 MET136 FREQUENCY EQUATION FOR CYLINDER-NARROW BANDWIDTH PULSES

REQUESTOR R. PETERSON METALLURGY

PROGRAMMER A. STRECOK

A FREQUENCY EQUATION, WHICH AROSE FROM STUDY OF MECHANICAL VIBRATIONS IN A SOLID ROD, IS SOLVED.

704F REFERENCES FILE CODES APSB 0 C3

1257 PAD QUADRUPLE MAGNET BEAM CALCULATION

REQUESTOR R. JOKIPPI PARTICLE ACCELERATOR

CONSULTANT N. MOREHOUSE PROGRAMMERS L. JUST, W. SCOTT

PRELIMINARY CALCULATIONS TO PROVE FEASIBILITY OF ANALOG COMPUTER SOLUTION.

ANA REFERENCES FILE CODES

1260 RE EBWR CONTROL ANALYSIS

REQUESTOR N. SUDA REACTOR ENGINEERING

PROGRAMMER L. JUST

CONTROL SYSTEM ANALYSIS REGARDING THE DYNAMIC BEHAVIOR OF EBWR.

ANA REFERENCES FILE CODES

1261 PHY231 CROSS SECTIONS FOR REACTION OF SECONDARY IONS

REQUESTOR S. WEXLER PHYSICS

CONSULTANT E. BAREISS PROGRAMMER B. GARBOW

A TRANSCENDENTAL EQUATION IS SOLVED YIELDING, AS A FUNCTION OF A SUPPLIED PARAMETER, AN ASSOCIATED CROSS SECTION.

704F REFERENCES ANF208 FILE CODES PSB 0 C5

1262 AMD146 THEOREM PROVING

REQUESTOR G. ROBINSON APPLIED MATHEMATICS

PROGRAMS ARE TO BE DEVELOPED AND TESTED FOR PROVING THEOREMS OF THE PREDICATE CALCULUS AND RELATED AREAS OF MATHEMATICS. EXPERIENCE WITH THE DAVIS-PUTNAM PROCEDURE HAS SHOWN THAT, UNLESS SOME DEGREE OF FORESIGHT CAN BE BUILT INTO THE ALGORITHM, THE TIME REQUIRED TO GENERATE PROOFS OF THEOREMS HAVING ANY MATHETICAL CONTENT IS PROHIBITIVELY LARGE. INITIAL PHASES OF THE PROGRAMS WILL MECHANIZE VARICUS TYPES OF DISCRIMINATION BETWEEN POTENTIALLY PRODUCTIVE PROOF SEQUENCES AND SUPERFICIALLY LESS PROMISING.

704 REFERENCES FILE CODES Z0

1265 PHY232 COMPUTATION OF F(DELTA)

REQUESTOR J. SCHIFFER PHYSICS

PROGRAMMER J. DICK

COMPUTATION OF A FUNCTION OF THE RACAH COEFFICIENTS.

GEO REFERENCES PHY145,B-6 FILE CODES PS GO Z0

1266 PER102 WILD (LASL)

REQUESTOR C. LEE PERSONNEL

PROGRAMMER J. HEESTAND

TO PROVIDE THE PERSONNEL DIVISION WITH THE USE OF THE LOS ALAMOS PROGRAM WILD, A 704 FORTRAN CODE THAT DOES VARIOUS STATISTICAL CALCULATIONS ON COMPENSATION DATA. SPECIFICALLY - GIVEN DATA ON THE DISTRIBUTION OF SCIENTIFIC STAFF EMPLOYEES OF VARIOUS COMPANIES ACCORDING TO SALARY, EXPERIENCE, SCHOOLING AND RESPONSIBILITY, WILD SORTS AND GROUPS THE DATA INTO TABLES ACCORDING TO THE TYPE, LOCATION AND SIZE OF THE COMPANY, AND FOR EACH COLUMN OF EACH TABLE COMPUTES THE SALARY MEAN, STANDARD DEVIATION, STANDARD ERROR OF THE MEAN, SKEWNESS, KURTOSIS, AND PERCENTILE MEASURES.

704F REFERENCES FILE CODES PSB 0 G1

1268 RE START UP OF EBWR

REQUESTOR K. ALMENAS REACTOR ENGINEERING

PROGRAMMER L. BRYANT

DETERMINATION OF THE STARTUP TRANSIENTS OF EBWR.

ANA REFERENCES FILE CODES

1273 RE260 HYDRODYNAMIC CALCULATION OF REACTOR CORES

REQUESTOR B. HOGLUND REACTOR ENGINEERING

PROGRAMMER M. SCHLAPKOHL

COMPUTE NATURAL CIRCULATION CONDITIONS IN UP TO TEN DIFFERENT TYPES OF FUEL ELEMENTS, EACH OF WHICH MAY HAVE UP TO THREE GEOMETRICAL CHANGES IN THE AXIAL DIRECTION, ANY RADIAL OR AXIAL POWER DISTRIBUTION MAY BE SPECIFIED AND THE AXIAL POWER DISTRIBUTION MAY BE MADE A FUNCTION OF RADIAL POSITION.

INDIVIDUAL, COMPOUND AND COMMON RISERS MAY BE CONSIDERED AND EACH TYPE MAY HAVE UP TO THREE GEOMETRY CHANGES.

THE EFFECTS OF STEAM CARRY-UNDER INTO THE DOWNCOMER AND THE EFFECTS OF UP TO FIVE FLOW RESTRICTIONS CAN ALSO BE CALCULATED.

INPUT AND OUTPUT WILL BE IN METRIC UNITS.

704 REFERENCES FILE CODES D0

1274 PHY233 LEGENDRE POLYNOMIAL FITTING

REQUESTOR R. LANE PHYSICS

PROGRAMMER T. MICHEL

RESULTS OF ANGULAR DISTRIBUTIONS OF CROSS SECTIONS ARE FITTED BY A SERIES OF LEGENDRE POLYNOMIALS TO OBTAIN RESULTS TO BE COMPARED WITH THEORETICAL PREDICTIONS.

620 REFERENCES FILE CODES E2

1276 PER103 WILD PRIME

REQUESTOR C. LEE PERSONNEL

PROGRAMMER J. HEESTAND

TO MODIFY 1266/PER102 (WILD) TO PERFORM THE SAME STATISTICAL CALCULATIONS AS BEFORE, USING THE SAME INPUT DATA CARDS, BUT ELIMINATING THE DISTINCTIONS ON THE BASIS OF RESPONSIBILITY. THAT IS, DATA FOR ALL PERSONS WITH BS OR MS (PHD) DEGREES ARE TO BE COMBINED, REGARDLESS OF SUPERVISORY RESPONSIBILITY.

704F REFERENCES 1266/PER102 FILE CODES PSB 0 G1

1277 RE259 ADJUSTMENT OF NEUTRON SCATTERING DATA FOR CROSS SECTION DETERMINATION

REQUESTOR A. SMITH REACTOR ENGINEERING

PROGRAMMER G. DUFFY

THIS CODE REDUCES EXPERIMENTAL ELASTIC AND INELASTIC SCATTERING DATA TO DIFFERENTIAL CROSS SECTIONS EXPRESSED AS LEGENDRE POLYNOMIALS. A MONTE CARLO CALCULATION IS USED TO DESCRIBE A BEAM OF NEUTRONS STRIKING AN ERECT RIGHT CIRCULAR CYLINDER LATERALLY. ALL MEASUREMENTS ARE NORMALIZED TO A STANDARD, USUALLY CARBON. (THIS IS A REVISION AND EXTENSION OF THE GEORGE CODE 801/RE200.)

704F REFERENCES FILE CODES APSB 0 G6

1279 UC117 PION PRODUCTION

REQUESTOR R. HANDLER UNIVERSITY OF CHICAGO

PROGRAMMER B. GARBOW

AN EVENT PROGRAM FOR PIONS FOLLOWING THE ANALYSIS OF TRACKS IN A LIQUID HYDROGEN BUBBLE CHAMBER.

GEO REFERENCES 638/HE(PHY-146) FILE CODES G1

1280 RE FARET BURNUP CALCULATIONS

REQUESTOR P. PERSIANI REACTOR ENGINEERING

PROGRAMMER L. BRYANT

CALCULATIONS OF THE BEHAVIOR OF THE FUEL (DECAY AND PRODUCTION) IN THE FAST REACTOR TEST FACILITY, FOR VARIOUS FUEL ENRICHMENTS.

ANA REFERENCES FILE CODES

1282 IINSE ANALOG COMPUTER INSTRUCTION

REQUESTOR L. LAWYER INTERNATIONAL INSTITUTE

PROGRAMMERS L. BRYANT, L. JUST

PROVIDE INSTRUCTION FOR FIVE MEMBERS OF RE DIVISION ON THE APPLICATION AND TECHNIQUES OF ANALOG COMPUTERS WITH EMPHASIS ON REACTOR PROBLEMS.

ANA REFERENCES ANL6187 FILE CODES

1284 PAD135 DIMENSIONAL CHECK OF ZGS RING COMPONENTS

REQUESTORS W. HANSON, N. HILL PARTICLE ACCELERATOR

PROGRAMMER A. STRECOK

THIS PROGRAM CHECKS THE TOLERANCES OF ZGS RING COMPONENTS USING DATA TAKEN FROM DRAWINGS.

704F REFERENCES FILE CODES APSB 0 R0

1287 RE TRANSIENT HYDRODYNAMICS OF HEAT TRANSFER LOOP

REQUESTORS J. MARCHATERRE, J. CARTER, AND R. ANDERSON REACTOR ENGINEERING

CONSULTANT N. MOREHOUSE PROGRAMMER L. BRYANT

THE DESIGN OF HIGH PERFORMANCE NATURAL CIRCULATION BOILING SYSTEMS REQUIRES THAT THE BEHAVIOR OF THESE SYSTEMS UNDER TRANSIENT CONDITIONS BE CHARACTERIZED. TO DO THIS THE TIME AND SPACE DEPENDENT CONTINUITY, ENERGY AND MOMENTUM EQUATIONS FOR A NATURAL CIRCULATION SYSTEM WERE WRITTEN AND THE RESULTING SET OF EQUATIONS SOLVED SIMULTANEOUSLY UTILIZING AN ANALOG COMPUTER. A SET OF CRITERIA THAT THE ANALYTICAL MODEL MUST SATISFY WERE SET UP -

1) THE MODEL MUST PERFORM AN ACCURATE STEADY STATE CALCULATION OF RECIRCULATION RATE AND VAPOR VOLUME FRACTION.
2) THE MODEL MUST DESCRIBE THE TRANSIENT EXPERIMENTAL BEHAVIOR DURING VARYING POWER INPUTS.
3) THE MODEL MUST ACCURATELY PREDICT THE INCEPTION OF OSCILLATIONS IN THE NATURAL CIRCULATION SYSTEM.

THE RESULTING EQUATIONS WERE COMPARED WITH EXPERIMENTAL RESULTS AT TWO PRESSURES AND TWO GEOMETRIES AND MET THE ESTABLISHED CRITERIA. THE RESULTS WERE FOUND TO BE VERY SENSITIVE TO THE VELOCITY RATIO USED IN THE COMPUTATION. THE VELOCITY RATIO CORRELATION USED IN THE MODEL IS PRESENTED.

ANA REFERENCES FILE CODES

1288 AMD148 PARTIAL WAVE THEORY OF POSITRON-HYDROGEN ATOM COLLISIONS

REQUESTORS W. CODY, K. SMITH APPLIED MATHEMATICS

PROGRAMMER D. JORDAN

GENERALIZED VERSION OF 1035/AMD135.

1. CONSTANT SUBROUTINE FOR THE KERNELS DESCRIBED IN THE REFERENCE.
2. WRITE A CONTROL PROGRAM TO INTEGRATE SYSTEMS OF SECOND ORDER COUPLED INTEGER - DIFFERENTIAL EQUATIONS GIVEN THE ENERGY (K, SQUARED), L, NUMBER OF STATES (NST), NUMBER OF EQUATIONS (N), AND THE NUMBER OF OSCILLATORY SOLUTIONS (P).

704F REFERENCES 1035/AMD135 FILE CODES D1

1289 PHY235 (D,P) REACTION CODE, MK1A

REQUESTOR J. SCHIFFER PHYSICS

CONSULTANTS W. CODY, K. SMITH PROGRAMMER J. DICK

1. GIVEN PARAMETERS FOR INITIAL AND FINAL NUCLEI, INCIDENT DEUTERON ENERGY AND NEUTRON STATE, SOLVE DEUTERON AND PROTON RADIAL EQUATIONS.
2. COMPUTE CONTRIBUTIONS TO DIFFERENTIAL CROSS SECTIONS FOR EACH LM.

704F REFERENCES AMD-TM14,PHY209,234 FILE CODES APSB 0 D2,F1

1290 PHY234 DISTORTED WAVE CODE (LASL)

REQUESTOR J.YNTEMA PHYSICS

PROGRAMMER W. GREENHOW

TO COMPILE AND PLACE IN PRODUCTION STATUS TOBOCMAN'S (D,P) DISTORTED WAVE CODE PROGRAMMED BY B.K. SWARTZ AT LOS ALAMOS.

704F REFERENCES PHYS.REV.94,1655(1954) FILE CODES D2

1291 RE ANALOG COMPUTER SOLUTION OF DIFFUSION EQUATION

REQUESTOR C. KELBER REACTOR ENGINEERING

CONSULTANT N. MOREHOUSE PROGRAMMER L. JUST

CONSTRUCT ANALOG MODEL TO SIMULATE A HIGH-FLUX REACTOR. CHECK RESULTS WITH DIGITAL RESULTS.

ANA REFERENCES ANL6482 FILE CODES

1292 MET137 PATTERSON SUPERPOSITION CRYSTALLOGRAPHY PROGRAM (HARVARD)

REQUESTOR M. MUELLER METALLURGY

PROGRAMMER C.CHAMOT

THIS PROGRAM WAS WRITTEN BY PENFOLD, HARVARD UNIVERSITY, FOR EVALUATING THE BUERGER MINIMUM FUNCTION IN SOLVING PATTERSONS. A PREREQUISITE FOR ITS USE IS A BINARY OUTPUT TAPE FROM THE SLY-SHOEMAKER FOURIER PROGRAM (MET133). THIS TAPE IS USED AS INPUT FOR A PRELIMINARY PART OF THE SUPERPOSITION PROGRAM. FINAL OUTPUT IS IN CODED FORM ON A SCALE OF 0 TO 39. THE NUMBER ASSOCIATED WITH EACH GRID POINT BEING REPRESENTED BY A SINGLE HOLLERITH CHARACTER. THE PROGRAM CONSISTS OF -

PART 1. EXPANSION OF MIFR1 BINARY OUTPUT TO A COMPLETE UNIT CELL.
PART 2. EVALUATION OF BUERGER MINIMUM FUNCTION.
PART 3. OUTPUT OF MAP IN CODED FORM.
A PART 4. ZERO LEVEL SUPERPOSITION PATTERSON HAS BEEN ADDED TO THE PROGRAM FOR ARGONNE USE.

704F REFERENCES FILE CODES PSB 0 Z0

1294 PHY236 DISTRIBUTION OF RESONANCE AVERAGE VALUES OF PARTIAL RADIATION WIDTHS

REQUESTOR R. CARPENTER PHYSICS

PROGRAMMER B. GARBOW

A FREQUENCY DISTRIBUTION IS MADE OF PARTIAL RADIATION WIDTHS GENERATED AS SUMS OF RANDOM VARIABLES FROM THE CHI-SQUARE DISTRIBUTION.

704F REFERENCES FILE CODES PSB 0 Z0

1295 CHM143

REQUESTOR S. SIEGEL CHEMISTRY

PROGRAMMER C. CHAMOT

GENERATION OF INPUT DATA FOR CRYSTALLOGRAPHIC PROGRAMS 1178/MET133 AND 750/CHM119.

704F REFERENCES FILE CODES PSB 0 Z0

1296 SSS122 CALCULATIONS OF CRYSTAL RADII WITH THE ORIGINAL PAULING POTENTIAL

REQUESTORS F. FUMI, M. TOSI SOLID STATE SCIENCE

PROGRAMMER A. STRECOK

CHARACTERISTIC LENGTHS FOR THE ALKALI AND HALOGEN IONS IN THE ALKALI HALIDE CRYSTALS RELEVANT FOR THE OVERLAP REPULSIVE INTERSECTIONS BETWEEN THE ION CORES ARE DETERMINED. THE FORM ADOPTED FOR THE OVERLAP REPULSIVE ENERGY IS THE ORIGINAL ONE PROPOSED BY L. PAULING.

704F REFERENCES 1068/SSS114 FILE CODES PSB 0 C4

1298 IINSE ANALOG COMPUTER INSTRUCTION

REQUESTOR M. GROTENHUIS INTERNATIONAL INSTITUTE

CONSULTANT N. MOREHOUSE PROGRAMMERS L. BRYANT,L. JUST

PROVIDE INSTRUCTION ON PROGRAMMING AND OPERATION OF ANALOG COMPUTERS.

ANA REFERENCES ANL6187 FILE CODES

1300 CEN105 ALLOY THEORY I

REQUESTOR H. FEDER CHEMICAL ENGINEERING

CONSULTANT W. CODY PROGRAMMER A. STRECOK

GELLMAN-BRUCKNER TREATMENT OF ELECTRONIC INTERACTION IN DENSE PLASMAS IS USED TO DETERMINE THE ENERGETIC CHANGE DUE TO INSERTION OF A SQUARE POTENTIAL WELL OR A POINT CHARGE. FIVE INTEGRALS ARE EVALUATED FOR USE IN THE THEORY OF SOLID SOLUTION FORMATION IN METALS.

704F REFERENCES FILE CODES APSB 0 D1

1301 BIM105 ANALYSIS OF BLOOD ELEMENTS OF IRRADIATED RATS

REQUESTOR M. DIPERT BIOLOGICAL AND MEDICAL RESEARCH

PROGRAMMER J. HEESTAND

LEAST SQUARES ANALYSIS OF VARIOUS COMBINATIONS OF BLOOD DATA FROM IRRADIATED RATS, TO BE PRODUCED IN A FORM SUITABLE FOR PUBLICATION. GRAPHS AS WELL AS TABULATED DATA ARE PRODUCED.

704F REFERENCES FILE CODES PSB 0 E1,E2

1302 SSS123

REQUESTOR P. ROACH SOLID STATE SCIENCE

PROGRAMMER B. GARBOW

A RATIONAL FUNCTION OF 4 PARAMETERS IS FITTED TO A SET OF DATA.

704F REFERENCES FILE CODES PSB 0 E2

1306 CHM144

REQUESTOR K. SANE CHEMISTRY

PROGRAMMER A. STRECOK

THIS PROBLEM CONSISTS OF SEVERAL VARIATIONS OF THE PROGRAM 1236/CHM142.

704F REFERENCES 1236/CHM142 FILE CODES APSB 0 D1

1308 TIN SOLUTION OF IODINE-XENON EQUATIONS

REQUESTOR B. DIETER TECHNICAL INFORMATION

PROGRAMMER L. JUST

PLOT OF XENON-TRANSIENTS AFTER SHUT-DOWN FROM VARIOUS FLUX LEVELS.

ANA REFERENCES FILE CODES

1311 AMD149 FSS1

REQUESTOR D. HODGES APPLIED MATHEMATICS

CONSULTANT J. BUTLER PROGRAMMER D. HODGES

DATA REDUCTION OF THE PAPER TAPES PRODUCED BY A FLYING SPOT SCANNER, EXPERIMENTAL MODEL.

GEO REFERENCES FILE CODES T1

1312 PHY237 PATTERN RECOGNITION BY RANDOM NETWORKS

REQUESTOR R. RINGO PHYSICS

CONSULTANT J. BUTLER PROGRAMMER J. GREGORY

RECOGNITION OF SIMPLE PATTERNS OF SIGNIFICANCE IN NUCLEAR AND PARTICLE PHYSICS DETECTORS SUCH AS EMULSIONS AND BUBBLE CHAMBERS BY COMPUTER SIMULATION OF LARGE RANDOMLY CONNECTED NEUTRON NETWORKS.

GEO REFERENCES FILE CODES T1

1314 PHY238 QUADRUPOLE FORCES IN NUCLEI

REQUESTOR M. SOGA PHYSICS

PROGRAMMER B. GARBOW

A SET OF NON-LINEAR EQUATIONS IS TO BE SOLVED IN CALCULATING THE EFFECTS OF A PAIRING FORCE AND A QUADRUPOLE-QUADRUPOLE FORCE ON NUCLEAR SPECTRA AND THE GAMMA TRANSITION PROBABILITIES BETWEEN THE FIRST 2+ LEVELS AND GROUND STATES OF NUCLEI.

704F REFERENCES ANZ013,PHYS.REV.120,957 FILE CODES PSB 0 E2,C4

1315 RPY129 STUDY OF RADIUM AND RADON CONTENT IN MICE

REQUESTOR C. MILLER RADIOLOGICAL PHYSICS

PROGRAMMER J. KAGANOVE

COMPUTES DAILY RADIUM AND RADON RETENTION IN MICE AFTER FEEDING PERIOD.

704F REFERENCES FILE CODES APSB 0 Z0,D0

1316 PHY239 DISTRIBUTION OF NUCLEAR LEVELS

REQUESTOR C. HIBDON PHYSICS

PROGRAMMER B. GARBOW

AN INTEGRAL REPRESENTING THE DISTRIBUTION OF NUCLEAR LEVELS IS TABULATED WITH THE INTEGRAL EVALUATED AS A DIFFERENCE OF EXPONENTIAL INTEGRALS.

704F REFERENCES FILE CODES PSB 0 C3

1320 CHM145 MONTE CARLO CALCULATION OF THE ENERGY LOST IN A SLURRY SYSTEM CONTAINING SOLID UO2 - THO2 IN WATER

REQUESTOR L. STEELE CHEMISTRY

CONSULTANT J. COOK PROGRAMMER D. CARSON

COMPUTATION OF THE FRACTION OF KINETIC ENERGY LOST BY EACH FRAGMENT PRODUCED DUE TO FISSION WHEN A SLURRY OF URANIUM ATOMS IN WATER IS EXPOSED TO A NEUTRON FLUX.

704F REFERENCES FILE CODES APSB 0 G6

1323 PHY240 MASS SPECTROMETER DATA PROCESSING OF INTENSITY - PRESSURE RELATIONSHIPS

REQUESTOR S. WEXLER PHYSICS

PROGRAMMER M. WELCH

EXPERIMENTAL DATA FROM MASS SPECTROMETER RUNS ARE TO BE PROCESSED FOR GRAPH PLOTTING AND IN TABULAR FORM FOR LATER ANALYSIS.

DATA FOR RUNS CONSIST OF A CHRONOLOGICAL LISTING OF PEAK HEIGHT, BACKGROUND, AND INTENSITY SCALE USED FOR A PARTICULAR MASS UNIT, INTERSPERSED ARE READINGS OF PRESSURE. THE TIME IS RECORDED FOR EACH PEAK HEIGHT OR PRESSURE READING LISTED.

ADDITIONAL OPTION-TWO ALTERNATE METHODS OF NORMALIZING VALUES WITHIN AN EXPERIMENT, AT SELECTED PRESSURES.

A SECOND PROGRAM TO CORRELATE AS MANY AS FIVE EXPERIMENTS HAS BEEN INCLUDED.

704F REFERENCES FILE CODES PSB 0 E0

1324 PHY241 CLUSTER MODEL OF LITHIUM 6

REQUESTOR D. INGLIS PHYSICS

PROGRAMMER B. GARBOW

A FUNCTION OF THREE PARAMETERS IS TO BE EVALUATED FOR VARIOUS CHOICES OF THE PARAMETERS IN AN EFFORT TO LOCATE THE MAXIMUM. IT IS ANTICIPATED THAT A SIMILAR FUNCTION FOR LITHIUM 7 IS ALSO TO BE EVALUATED IN SEARCH OF ITS MAXIMUM.

704F REFERENCES FILE CODES PSB 0 Z0

1329 RE261 AUERBACH OPTICAL MODEL CODE (BNL)

REQUESTOR P. MOLDAUER REACTOR ENGINEERING

PROGRAMMER S. ZAWADZKI

THIS PROGRAM, ABACUS-2, IS TO BE ADDED TO THE AMD PROGRAM LIBRARY FOR ANL USE.

704F REFERENCES FILE CODES 0 D2

1332 RE263 FRICTION FACTORS

REQUESTOR H. FAUSKE REACTOR ENGINEERING

PROGRAMMER G. JENSEN

COMPUTES THE FRICTION FACTORS FOR TWO-PHASE FLOW IN 5 REGION CYLINDRICAL PIPES.

704F REFERENCES FILE CODES PSB 0 Z0

1335 RE266 RESONANCE INTEGRAL CALCULATION

REQUESTOR P. PERSIANI REACTOR ENGINEERING

PROGRAMMER J. KAGANOVE

COMPUTES INFINITE DILUTION CAPTURE OR CAPTURE, FISSION, AND ABSORPTION RESONANCE INTEGRALS AND CROSS SECTIONS AT POSITIVE AND NEGATIVE ENERGY LEVELS.

704F REFERENCES FILE CODES D1

1336 RE267 SOLUTION OF DIFFERENTIAL EQUATIONS FOR A TEMPERATURE DISTRIBUTION IN A RADIATING MEDIUM

REQUESTOR R. VISKANTA REACTOR ENGINEERING

PROGRAMMER A. RAGO

DIFFERENTIAL EQUATIONS DESCRIBING THE TEMPERATURE DISTRIBUTION IN A MEDIUM WHICH ABSORBS AND EMITS THERMAL RADIATION ARE TO BE SOLVED. ITERATION IS REQUIRED SINCE ALL BOUNDARY CONDITIONS CANNOT BE SPECIFIED AT THE INITIAL POSITION VALUE.

704F REFERENCES FILE CODES D2

1338 SSS124 CALCULATION OF REPULSIVE PARAMETERS IN THE MIE-PAULING POTENTIAL

REQUESTORS F. FUMI, M. TOSI SOLID STATE SCIENCE

PROGRAMMER A. STRECOK

THE VARIABLE METRIC METHOD IS EMPLOYED TO FIND MINIMA OF A FUNCTION OF 10 PARAMETERS.

704F REFERENCES ANZ013 FILE CODES APSB 0 E2

1341 RE268 EBR II TEMPERATURE AND FLOW ANALYSIS

REQUESTOR J. KAELLIS REACTOR ENGINEERING

PROGRAMMER J. KOERNER

TEMPERATURE AND FLOW ANALYSIS OF THE EBR II PRIMARY AND SECONDARY SODIUM AND TERTIARY STEAM SYSTEM.

704F REFERENCES FILE CODES 0 ZO

1344 PAD136 DETERMINATION OF A/B RATIO

REQUESTOR G. CALABRESE PARTICLE ACCELERATOR

PROGRAMMER M. BUTLER

WITH NO EXTERNAL RESISTANCE COMPUTE A/B RATIO AT BEGINNING AND END OF PULSE FOR THE 6TH, 12TH, 18TH, AND 24TH HARMONICS.

704F REFERENCES FILE CODES ZO

1345 RPY130 IRON ROOM SCINTILLATION COUNTER ANALYSIS

REQUESTOR C. MILLER RADIOLOGICAL PHYSICS

PROGRAMMER W. SNOW

A PROGRAM TO HANDLE VARIOUS COMPUTATIONS AND DATA REDUCTION CONNECTED WITH THE OUTPUT OF A 400-CHANNEL ANALYZER.

GEC REFERENCES FILE CODES ZO

1348 AMD150 A TAXONOMY PROGRAM (IBM)

REQUESTOR J. BUTLER APPLIED MATHEMATICS

CONSULTANTS J. BUTLER, D. WOODWARD

THE IBM-DEVELOPED TAXONOMY PROGRAM IB CLF WHICH WAS SET UP TO AUTOMATICALLY COMPARE AND CLASSIFY QUALITATIVE DATA IS TO BE USED AS AN EXPERIMENTAL PROGRAM FOR RESEARCH PURPOSES.
VARIOUS METHODS OF ASSIGNING ATTRIBUTES AND PREPARING INPUT DATA WILL BE PROGRAMMED, AS WELL AS POSSIBLE MODIFICATIONS AND SUBSIDIARY CALCULATIONS.

704 REFERENCES FILE CODES MO,TO

1358 CHM146 MASS YIELD CALCULATION

REQUESTOR J. UNIK CHEMISTRY

PROGRAMMER S. ZAWADZKI

THIS PROGRAM TRANSFORMS AN EXPERIMENTALLY DETERMINED FISSION KINETIC ENERGY DISTRIBUTION FOR A GIVEN TOTAL KINETIC ENERGY RELEASE TO A MASS YIELD DISTRIBUTION. THE PROGRAM WILL ALSO SUM THE INDIVIDUAL MASS YIELD DISTRIBUTIONS OVER ALL POSSIBLE TOTAL KINETIC ENERGY RELEASES TO OBTAIN THE TOTAL FISSION MASS YIELD DISTRIBUTION.

GEO REFERENCES FILE CODES ZO

1359 RPY131 ELECTRON DRIFT VELOCITY STUDIES

REQUESTOR J. BOWE RADIOLOGICAL PHYSICS

PROGRAMMER B. GARBOW

EVALUATION OF SEVERAL INFINITE SERIES. FOR EACH OF SEVERAL ELEMENTS, A DRIFT SERIES AND A NORMALIZATION SERIES ARE EVALUATED.

704F REFERENCES FILE CODES PSB O CO

1360 PHY242 DIFFRACTION GRATING

REQUESTOR J. URETSKY PHYSICS

CONSULTANT D. PHILLIPS PROGRAMMER R. MORRILL

CALCULATION OF A SET OF FUNCTIONS RL FOR USE IN A STUDY OF THE THEORY OF ACOUSTIC REFLECTIONS FROM A SINUSOIDAL SURFACE ON WHICH THE PRESSURE VANISHES.

704F REFERENCES FILE CODES ZO

1362 IINSE AN EXPERIMENT IN THE ANALOG SIMULATION OF A PRESSURIZED WATER REACTOR

REQUESTOR D. MILLER INTERNATIONAL INSTITUTE

PROGRAMMER R. BARE

THIS IS AN EXPERIMENT TO BE PERFORMED ON THE ANALOG COMPUTER BY THE STUDENTS OF THE IINSE. THIS EXPERIMENT BRIDGES THE GAP BETWEEN THE SIMPLE EXERCISES THAT ARE AVAILABLE FOR THE ANALOG AND THE VERY COMPLEX PRODUCTION PROBLEMS.

ANA REFERENCES FILE CODES

1363 AMD151 NUCLEAR MATTER

REQUESTOR J. REYNOLDS APPLIED MATHEMATICS

CALCULATION OF VOLUME AND SURFACE PROPERTIES IN THE PUFF-MARTIN APPROXIMATION, USING A NEW PRESSURE EQUATION TO INSURE STABILITY OF SURFACE SOLUTIONS.

704F REFERENCES FILE CODES D1,2,E1

1366 HEP111 3-BODY PRODUCTION AND DECAY (LRL)

REQUESTOR L. HYMAN HIGH ENERGY PHYSICS

PROGRAMMER M. BUTLER

THE GENERATION OF THREE-BODY PRODUCTION AND DECAY PROCESSES FOLLOWING PHASE-SPACE DISTRIBUTION BY A MONTE CARLO PROCEDURE. PROGRAM DEVELOPED AT LAWRENCE RADIATION LABORATORY BY JOHN KADYK AND GORDON SUTHERLAND. MODIFIED AT ANL FOR USE WITH HEP BNL PI+, N DECAY INTO PI+, PI-, P EXPERIMENT.

704F REFERENCES FILE CODES SB 0 G6

1367 CHM147 CALCULATION OF CONFIDENCE INTERVALS FOR SIGMA (LI, UI)

REQUESTOR A. JAFFEY CHEMISTRY

CONSULTANT J. BUTLER PROGRAMMER A. STRECOK

THIS PROGRAM PRODUCES TABLES OF CONFIDENCE INTERVALS FOR THE CHI-SQUARE DISTRIBUTION. THREE TYPES OF CONFIDENCE INTERVALS ARE COMPUTED -

EQUAL TAIL AREAS, MINIMUM INTERVAL, AND LOGARITHMICALLY MINIMUM INTERVAL.

704 REFERENCES FILE CODES APSB 0 C5

1368 AMD152 EFFECT OF POSITRONIUM FORMATION ON THE CROSS SECTIONS FOR THE SCATTERING OF POSITRONS BY ATOMIC HYDROGEN ABOVE THRESHOLD

REQUESTOR W. CODY APPLIED MATHEMATICS

MODIFY AND RUN 1035/AMD135 FOR POSITRON ENERGIES ABOVE THRESHOLD ENERGY FOR THE FORMATION OF POSITRONIUM.

704F REFERENCES FILE CODES D1

1371 RE269 REX (WITH OUTPUT MODIFICATION)

PROGRAMMER M. BUTLER

THIS VERSION OF THE REX PROGRAM IS MODIFIED TO PROVIDE COMPATIBILITY WITH THE PERT CODE AND OTHER PROGRAMS DESIRING REX SOURCE AND FLUX OUTPUT. THE OPTION TO USE RESULTS OF THE PREVIOUS PROBLEM AS THE INITIAL SOURCE AND FLUXES HAS NO EFFECT AND THE TAPE 6 WRITTEN BY THIS PROGRAM UNDER SENSE SWITCH 6 CONTROL CONTAINS THE SOURCE AND FLUX OUTPUT FOR SUCCESSIVE PROBLEMS OF ONE MACHINE RUN (3+J RECORDS EACH).

704 REFERENCES FILE CODES 0 D0

1372 BIM106

REQUESTOR G. SACHER BIOLOGICAL AND MEDICAL RESEARCH

PROGRAMMER J. MILLER

GIVEN 2 SETS OF DATA ON SURVIVAL TIMES OF IRRADIATED RATS, FIND A FUNCTION WITH A CONTINUOUS FIRST AND SECOND DERIVATIVE THAT FITS EACH SET OF DATA SO THAT THE DIFFERENCE BETWEEN THE OBSERVED AND CALCULATED DATA IS LESS THAN TWICE THE STANDARD ERROR FOR AT LEAST ALL BUT TWO DATA POINTS. EVALUATE THE FIRST AND SECOND DERIVATIVES AT POINTS OF OBSERVATION AND AT REGULARLY SPECIFIED INTERVALS.

704F REFERENCES GEFCDIS FILE CODES APSB 0 E2

1375 RPY132 CALCULATION OF STATISTICS IN COUNTING LONG DECAY CHAINS

REQUESTOR H. LUCAS RADIOLOGICAL PHYSICS

CONSULTANT D. WOODWARD PROGRAMMER D. CARSON

THIS PROGRAM CALCULATES THE QUANTITY SIGMA**2/NU(1) WHERE SIGMA**2=NU(2)-NU(1)**2 FOR RA224 AND RN222. FOR RA224, NU(1)= Q(1)+2Q(2)+3Q(3)+4Q(4), NU(2)=Q(1)+4Q(2)+9Q(3)+16Q(4). FOR RN222 NU(1)=Q(1)+2Q(2)+3Q(3), NU(2)=Q(1)+4Q(2)+9Q(3). THE Q(1) REFER TO THE PROBABILITY OF 1,2,3, OR 4 ALPHA PARTICLES BEING EMITTED.

704F REFERENCES FILE CODES PSB 0 Z0

1376 HEP112 SPATIAL RECONSTRUCTION OF SPARK CHAMBER DATA

REQUESTOR R. SCHLUTER HIGH ENERGY PHYSICS

CONSULTANT J. BUTLER PROGRAMMER J. GREGORY

THIS PROGRAM PERFORMS SPATIAL RECONSTRUCTION OF DATA DERIVED FROM FILM RECORDS OF A SPARK CHAMBER EXPERIMENT.

INPUT IS IN THE FORM OF PAPER TAPE PRODUCED EITHER BY A MANUAL SCANNING TABLE OR AN AUTOMATIC SCANNER, IF THIS IS FEASIBLE.

704F REFERENCES FILE CODES R0

1377 AMD153 SIMULATION OF PATTERN RECOGNITION MACHINE

REQUESTOR J. BUTLER APPLIED MATHEMATICS

PROGRAMMER H. GRAY

THIS PROGRAM IS INTENDED TO SIMULATE A POSSIBLE GENERAL PURPOSE PATTERN RECOGNITION MACHINE BASED ON THE PRINCIPLE OF RANDOM SCANNING OVER TRANSFORMATION GROUPS.

GEO REFERENCES FILE CODES T1

1378 AMD154 RANDOM NUMBER TESTS

REQUESTOR J. BUTLER APPLIED MATHEMATICS

PROGRAMMER H. GRAY

THIS PROGRAM PROVIDES SENSITIVE TESTS OF ALL BIT POSITIONS IN RANDOM NUMBERS BY THE MIXED ADDITIVE-CONGRUENTIAL METHOD.

GEO REFERENCES FILE CODES G5

1379 MET139 ORIENTATION LEAST SQUARES (ORNL)

REQUESTOR M. MUELLER METALLURGY

PROGRAMMER J. HEESTAND

THIS IS A PROGRAM SUPPLIED TO US BY DR. W.R. BUSING FROM OAK RIDGE FOR PERFORMING TWO OPERATIONS - (1) FIRST, IT USES INPUT ANGLE DATA FOR LEAST SQUARING THE CRYSTAL CELL CONSTANTS. HAVING OBTAINED THE VALUES, IT THEN (2) USES THESE TO CALCULATE ANGLE SETTINGS TO BE USED FOR OBTAINING ADDITIONAL DATA.

704 REFERENCES FILE CODES E2

1384 CHM148 CONSTANT DIFFERENCES OF SPECTRUM LINES

REQUESTOR M. FRED CHEMISTRY

PROGRAMMER J. MILLER

GIVEN SETS OF SPECTRUM LINE DATA, DETERMINE THE SIGNIFICANT SETS OF CONSTANT DIFFERENCES BY LOCATING ALL SETS (OF DIFFERENCES) WITH 3 OR MORE MEMBERS WHICH ARE WITHIN A GIVEN TOLERANCE.

704F REFERENCES FILE CODES PSB 0 M1

1387 RE270 RESONANCE INTEGRAL CALCULATION

REQUESTOR H. HUMMEL REACTOR ENGINEERING

PROGRAMMER A. RAGO

DETERMINATION OF RESONANCE INTEGRALS FOR DOPPLER COEFFICIENT CALCULATIONS. INITIALLY THE NARROW RESONANCE APPROXIMATION WILL BE USED AND THE INTERFERENCE BETWEEN RESONANCE AND POTENTIAL SCATTERING WILL BE NEGLECTED. THE CALCULATION OF THE PSI FUNCTION DESCRIBING DOPPLER BROADENING OF SINGLE LEVEL CROSS SECTIONS WILL INITIALLY MAKE USE OF EXISTING PROGRAMS UTILIZING TABLE LOOK-UP METHODS. FURTHER PROGRAMMING WORK MAY BE REQUIRED TO STUDY REFINEMENTS IN THE EVALUATION OF THE RESONANCE INTEGRALS.

704F REFERENCES FILE CODES D0

1391 HEP113 KINEMATICAL ANALYSIS OF SPARK CHAMBER EVENTS IN THE SIGMA-LAMBDA RELATIVE PARITY EXPERIMENT

REQUESTOR L. VOYVODIC HIGH ENERGY PHYSICS

CONSULTANT J. BUTLER PROGRAMMER R. ROYSTON

THE INDIVIDUALLY RECONSTRUCTED TRACKS OBTAINED FROM 1376/HEP112 ARE COMBINED INTO A COMPLETE PICTURE OF THE SIGMA-LAMBDA RELATIVE PARITY EXPERIMENT.

THE PION AND PROTON FROM THE LAMBDA DECAY ARE FIRST IDENTIFIED BY THE NECESSITY FOR THEIR KINEMATICS TO BE CONSISTENT WITH A LAMBDA PARTICLE ORIGINATING IN THE TARGET. THE DIRECTION AND MOMENTUM OF THE LAMBDA PARTICLE ARE DETERMINED AT THE SAME TIME.

THE DEGREE OF POLARIZATION OF THE LAMBDA PARTICLE IS DETERMINED FROM THE DISTRIBUTION OF THE ANGLE BETWEEN THE LAMBDA DECAY PLANE AND THE PRODUCTION PLANE. IN THE FIRST STAGE OF THE EXPERIMENT THE DEGREE OF POLARIZATION OF THE SIGMA PARTICLES IS DETERMINED FROM THE FACT THAT WHEN THE AVERAGE IS TAKEN OVER ALL DECAY ANGLES OF THE SIGMA PARTICLE, THE LAMBDA PARTICLES ARE POLARIZED ONE-THIRD AS MUCH AS THE SIGMA PARTICLES. THIS RELATION IS INDEPENDENT OF THE RELATIVE PARITY OF THE TWO PARTICLES.

IN THE SECOND STAGE OF THE EXPERIMENT THE MOMENTUM OF THE SIGMA PARTICLE IN EACH EVENT IS DETERMINED FROM THE KINEMATICS OF THE WHOLE SYSTEM. USING THE FORMULA OF MICHEL AND ROUHANI NEJAD FOR THE CORRELATION BETWEEN THE VARIOUS ANGLES WHICH ENTER, A LIKELIHOOD RATIO FOR THE RELATIVE PARITY BEING EVEN OR ODD IS THEN ESTABLISHED.

704F REFERENCES FILE CODES ZO

1393 SSS125 ENERGY OF A SELF-TRAPPED HOLE IN AN ALKALI HALIDE CRYSTAL

REQUESTOR T. GILBERT SOLID STATE SCIENCE

PROGRAMMER A. STRECOK

THIS PROGRAM WILL COMPUTE THE ENERGY OF AN ALKALI HALIDE CRYSTAL WITH A SINGLE HOLE IN THE VALENCE BAND AS A FUNCTION OF THE DISPLACEMENTS OF THE IONS IN A LIMITED REGION AROUND THE POINT WHERE A HOLE CAN BE SELF-TRAPPED AT A PAIR OF HALOGEN IONS TO FORM A CERTAIN TYPE OF MOLECULE-ION IN THE LATTICE.

704F REFERENCES FILE CODES ZO

1394 PAD AN ANALOG MODEL OF THE ZGS BEAM FOCUSSING SYSTEM

REQUESTOR C. TURNER PARTICLE ACCELERATOR

CONSULTANT N. MOREHOUSE PROGRAMMER R. BARE

THE PURPOSE OF THIS STUDY IS TO DEVELOP AN ANALOG MODEL OF THE PROPOSED ZGS BEAM FOCUSSING SYSTEM. THE MODEL WILL BE USED TO DETERMINE THE APPROPRIATE CONDITIONS FOR THE CONTAINMENT AND FOCUSSING OF A VARIETY OF BEAMS. THE PROPOSED FOCUSSING SYSTEM IS COMPOSED OF A SERIES OF QUADRUPOLE ELECTROMAGNETS. THE MAGNET LOCATIONS, ORIENTATIONS, POLARITIES, AND STRENGTHS NECESSARY TO ACCOMPLISH THE FOCUSSING MUST BE DETERMINED.

THE PROPOSED ANALOG MODEL IS THE ONLY COMPUTATIONAL SYSTEM THAT OFFERS A CONTINUOUS STUDY OF THE BEAM ORIENTATION AND CROSS-SECTIONAL DIMENSIONS WITH RESPECT TO THE BEAM TRAJECTORY. FROM THE CONTAINMENT STANDPOINT, THIS IS ESSENTIAL IN FACILITATING THE DESIGN WORK.

ANA REFERENCES FILE CODES

1396 PHY244 GAMMA RAY SPECTRA ANALYSIS

REQUESTOR R. CARPENTER PHYSICS

PROGRAMMER D. CARSON

THE SOLUTION TO THE MATRIX EQUATION C=RP IS REQUIRED, WHERE C IS A ROW EXPRESSING THE EXPERIMENTAL SPECTRUM, P IS A COLUMN OF UNKNOWN PHOTON INTENSITIES AND R IS AN EXPERIMENTALLY DETERMINED RESPONSE MATRIX. THE DIRECT SOLUTION IS EXTREMELY SENSITIVE TO STATISTICAL ERRORS IN C AND SYSTEMATIC ERRORS IN R. HERE, AN ITERATIVE APPROACH TO FIND A DIAGONAL MATRIX D SUCH THAT P=DC WILL BE TRIED.

704F REFERENCES FILE CODES APSB O FO

1397 PHY245 SHELL MODEL CALCULATION FOR O16, LI6, LI7

REQUESTOR D. INGLIS PHYSICS

PROGRAMMER B. GARBOW

THE PROGRAM IS IN TWO PARTS -

(A) DETERMINATION OF THE SERBER FORCE PARAMETER FROM O16.
(B) CALCULATION OF BINDING ENERGY OF L16 AND L17 WITH SEVERAL FORCE ASSUMPTIONS.

704F REFERENCES FILE CODES P B O ZO

1399 SSS126 TABLES OF N, I(N), V(N)

REQUESTOR J. MULLEN SOLID STATE SCIENCE

PROGRAMMER V. BARRILE

THIS PROGRAM CALCULATES TABLES OF VALUES SPECIFIED BY AN EXPRESSION INVOLVING SINES. THE OUTPUT IS PUNCHED ON CARDS FOR USE ON THE DATA PLOTTER.

704F REFERENCES FILE CODES PSB 0 Z0

1406 SSS127

REQUESTOR O. LOUNASMAA SOLID STATE SCIENCE

PROGRAMMER J. HEESTAND

TABULATE A FUNCTION INVOLVING HYPERBOLIC COSECANTS.

704F REFERENCES FILE CODES PSB 0 Z0

1410 MET140 THERMISTOR RESISTANCE TABLE

REQUESTOR J. KITTEL METALLURGY

PROGRAMMER V. BARRILE

LEAST SQUARES FIT THERMISTOR RESISTANCE READINGS VERSUS TEMPERATURE IN RANGE 19 TO 32 DEGREES C TO LINEAR AND QUADRATIC FORM. ON THE BASIS OF THESE RESULTS PREPARE A TABLE OF THERMISTOR RESISTANCE VS. TEMPERATURE IN DEGREES C FOR THE RANGE 19(.01)32 DEGREES C FOR REPRODUCTION BY GRAPHIC ARTS.

704F REFERENCES ANE209,ANC102 FILE CODES P M2

1412 CHM149

REQUESTOR G. WINSLOW CHEMISTRY

PROGRAMMER J. MILLER

GIVEN AN INTEGRAL EQUATION INVOLVING A POLYNOMIAL, FIND THE COEFFICIENTS OF THE POLYNOMIAL WHICH BEST APPROXIMATES THE SOLUTION. THE COEFFICIENTS ARE TO BE FOUND BY SOLVING A SET OF SIMULTANEOUS LINEAR EQUATIONS FORMED BY COMPUTING THE PARTIAL DERIVATIVES OF ANOTHER GIVEN INTEGRAL EQUATION.

704F REFERENCES K-1302 FILE CODES F4

1416 AMD155 GEMMA

REQUESTOR M. BUTLER APPLIED MATHEMATICS

CONSULTANT W. GIVENS PROGRAMMER G. DUFFY

THE PROGRAM WILL FIND THE EIGENVALUES AND EIGENVECTORS OF A REAL-VALUED MATRIX, A, IN THREE STEPS -

(1) REDUCTION OF A TO ALMOST TRIANGULAR FORM, T, BY ELIMINATION AND PIVOTING,
(2) REDUCTION OF T TO TRI-DIAGONAL FORM, D, BY ELIMINATION,
(3) GENERATION OF CHARACTERISTIC POLYNOMIAL AND SOLUTION OF CHARACTERISTIC EQUATION.

704F REFERENCES FILE CODES F2

1418 IINSE SIMULATION OF A BOILING WATER REACTOR

REQUESTOR J. BAIRD INTERNATIONAL INSTITUTE

PROGRAMMERS L. JUST, L. BRYANT

EXPERIMENT TO BE DONE FOR STUDENTS FROM MICHIGAN SCHOOL OF MINING AND TECHNOLOGY.

ANA REFERENCES FILE CODES

1419 RE EQUIVALENT TRANSFER FUNCTION STUDY FOR THE NON-LINEAR NEUTRON KINETICS EQUATIONS

REQUESTOR J. CARTER REACTOR ENGINEERING

CONSULTANTS D. SPARKS, J. TESSIER PROGRAMMERS L. BRYANT, L. JUST

DETERMINATION OF THE LEAST SQUARES FIT OF AN ANALYTICAL FUNCTION TO THE NEUTRON KINETICS EQUATIONS RESPONSES.

ANA REFERENCES FILE CODES

1420 PAD138

REQUESTOR G. CALABRESE PARTICLE ACCELERATOR

PROGRAMMER M. WELCH

PART 1. DETERMINE THE CURRENT IN THE ZGS CORRECTION COIL DUE TO THE MAIN MAGNET CURRENT WITH NO EXTERNAL RESISTANCE AND WITH EXTERNAL CAPACITANCE OF 20,000 MICROFARADS.
PART 2. DETERMINE THE CURRENT IN THE CORRECTION COIL DUE TO THE 6TH AND 12TH HARMONIC COMPONENTS OF THE RIPPLE VOLTAGE APPLIED TO THE MAIN MAGNET COIL.

704F REFERENCES FILE CODES D2

1422 SSS128 SCHOTTKY FUNCTION

REQUESTOR O. LOUNASMAA SOLID STATE SCIENCE

PROGRAMMER V. BARRILE

VALUES OF THE SCHOTTKY FUNCTION ARE TABULATED FOR VALUES OF T BETWEEN 0 AND 4.2.

704F REFERENCES FILE CODES PSB 0 Z0

1425 HEP114 CALCULATION OF LIKELIHOOD FUNCTION

REQUESTOR L. HYMAN HIGH ENERGY PHYSICS

CONSULTANT J. BUTLER PROGRAMMER M. BUTLER

THE PROBLEM IS TO SAMPLE FROM THE DENSITY

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P(X,Y) = .25(1+AXY**2)
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WHERE
A IS A PROBLEM PARAMETER AND X AND Y ARE BETWEEN -1 AND +1. THE LOGARITHM OF THE LIKELIHOOD FUNCTION FOR A SERIES OF VALUES IS COMPUTED ALSO.

704F REFERENCES FILE CODES

1428 CHM150 DISTORTED WAVE IMPULSE APPROXIMATIONS FOR DIRECT NUCLEAR REACTIONS AT HIGH ENERGIES

REQUESTOR P. BENIOFF CHEMISTRY

PROGRAMMER A. STRECOK

THE PROGRAM REPRESENTS AN OPTICAL AND SHELL MODEL FOR DISTORTED INCIDENT AND EXIT PARTICLE PLANE WAVES CAUSED BY NUCLEAR OPTICAL POTENTIALS.
IN MATHEMATICAL TERMS, A SET OF QUADRUPLE INTEGRALS IS TO BE EVALUATED.

704F REFERENCES FILE CODES D1

1429 AMD156 COMPUTER AUTOMATED DESIGN

REQUESTOR D. HODGES APPLIED MATHEMATICS

PROGRAMMER J. DICK

AN INITIAL ATTEMPT TO USE THE COMPUTER TO PROVIDE NECESSARY DETAILED CHECKS, ALPHABETICAL LISTS OF SIGNAL NAMES, WIRING PROCEDURES, WIRE SPECIFICATIONS AND SIGNAL NAME BOARD MAPS FOR USE IN AMD ENGINEERING DESIGN EFFORTS,
GIVEN -

1. PIN NUMBERS CORRESPONDING TO THE ORDER OF SIGNAL NAMES FOR EACH PCB TYPE
2. POSITION WHERE SIGNAL NAME GOES FOR EACH PIN
3. HORIZONTAL AND VERTICAL DISTANCES BETWEEN LIKE PINS ON ADJACENT PCBS, AND LIKE PINS ON LIKE PCB ON ADJACENT RACKS
4. DISTANCE BETWEEN PINS
5. A MINIMUM WIRE LENGTH AND STRIPPING ALLOWANCE.

704F REFERENCES FILE CODES S0

1430 CHM151 FISSION MASS-RATIO DISTRIBUTIONS

REQUESTOR J. UNIK CHEMISTRY

PROGRAMMER S. ZAWADZKI

THIS PROGRAM IS USED TO OBTAIN THE TOTAL KINETIC ENERGY DISTRIBUTION AND NUMBER OF RECORDED EVENTS FOR VARIOUS MASS RATIOS OF COINCIDENT PAIRS OF FISSION FRAGMENTS.

GEO REFERENCES FILE CODES Z0

1434 HEP115 KINEMATICAL ANALYSIS OF SPARK CHAMBER EVENTS CERN EXPERIMENT

REQUESTOR S. WARSHAW HIGH ENERGY PHYSICS

PROGRAMMERS D. CARSON

THIS IS TO BE THE FIRST KINEMATICS PROGRAM TO PROCEED FROM THE RESULTS OF THE SPARK CHAMBER TRACK ANALYSIS PROGRAM, TRAFIT 1242/HEP108. THE PARTICLES UPON WHICH THE KINEMATICS IS TO BE APPLIED ARE THE LAMBDA AND THE KAON.

704F REFERENCES FILE CODES G1

1436 RE272 MULTIPLE SCATTERING CORRECTIONS FOR MODERATOR LAW EXPERIMENT

REQUESTOR H. GREENSPAN REACTOR ENGINEERING

PROGRAMMER I. BAKSYS

REVISION OF THE ORIGINAL MULTIPLE SCATTERING PROGRAM DEVISED FOR RE216 TO SPEED-UP MACHINE PROCESSING TIME AND TO INCORPORATE OPTIONS TO PERMIT S OF ALPHA, BETA INPUT AS WELL AS CROSS SECTION INPUT, TO FACILITATE COOPERATIVE WORK WITH EGELSTAFF.

704 REFERENCES FILE CODES Z0

1440 AMD158 INFORMATION CONTENT OF DISCRETE PROCESSES

REQUESTOR W. COWELL APPLIED MATHEMATICS

GIVEN A SEQUENCE OF SYMBOLS FROM A FINITE ALPHABET STORED ON TAPE IN APPROPRIATE FORMAT, THE PROGRAM TABULATES THE FREQUENCIES OF OCCURRENCES OF SYMBOLS (1-GRAMS), CONSECUTIVE PAIRS OF SYMBOLS (2-GRAMS),..., (N-GRAMS) AND USES THE RELATIVE FREQUENCIES AS ESTIMATES OF THE PROBABILITIES OF THE VARIOUS N-GRAMS. IT THEN CALCULATES THE INFORMATION CONTENT OF THE SEQUENCE (IN THE SENSE OF SHANNON).

ONE APPLICATION OF THE PROGRAM IS TO STUDY SEQUENCES OF COMPUTER INSTRUCTIONS. A TRACE PROGRAM HAS BEEN WRITTEN WHICH ENABLES US TO COLLECT AS DATA THE SEQUENCE OF ORDERS AS THEY ARE PERFORMED IN THE EXECUTION OF A GIVEN 704 PROGRAM. THIS SEQUENCE MAY THEN BE SUBJECTED TO THE ABOVE ANALYSIS. CURRENT ACTIVITY INCLUDES FURTHER DEBUGGING OF THE TRACE PROGRAM AND APPLICATION TO LIBRARY PROGRAMS.

THE ANALYSIS PROGRAM COULD ALSO BE APPLIED TO PROCESSES SUCH AS ENGLISH TEXT AND TO THE TESTING OF SEQUENCES OF PSEUDO-RANDOM NUMBERS.

704 REFERENCES FILE CODES T0

1442 SSS129 DETERMINATION OF REPULSIVE PARAMETERS IN THE BORN-MAYER POTENTIAL

REQUESTORS F. FUMI, M. TOSI SOLID STATE SCIENCE

PROGRAMMER A. STRECOK

CHARACTERISTIC LENGTHS FOR THE ALKALI AND HALOGEN IONS IN THE ALKALI HALIDE CRYSTALS, RELEVANT FOR THE OVERLAP REPULSIVE INTERACTIONS BETWEEN THE ION CORES, ARE DETERMINED. THE FORM ADOPTED FOR THE OVERLAP REPULSIVE ENERGY IS THE ONE PROPOSED BY BORN AND MAYER.

704F REFERENCES FILE CODES E2

1447 IHS102 LEAST SQUARES FIT

REQUESTOR L. ANDERSON INDUSTRIAL HYGIENE AND SAFETY

PROGRAMMER J. HEESTAND

PERFORM LEAST SQUARES FIT TO THE FUNCTION Y=B(1)+B(2)/(X+B(3))**2.

704F REFERENCES FILE CODES E2

1452 CEN106 ENERGY LOSS OF ALPHA PARTICLES IN PLUTONIUM HEXAFLUORIDE

REQUESTOR M. STEINDLER CHEMICAL ENGINEERING

CONSULTANT J. BUTLER PROGRAMMER J. HEESTAND

THIS PROGRAM CALCULATES THE ENERGY LOSS OF ALPHA PARTICLES IN A SPHERICAL CONFIGURATION OF PLUTONIUM HEXAFLUORIDE BY DOUBLE INTEGRATION.

704F REFERENCES FILE CODES APSB 0 D1

1453 PHY247 MULTI CHANNEL ANALYZER TAPE PROCESSING

REQUESTOR J. SCHIFFER PHYSICS

PROGRAMMER S. ZAWADZKI

VAN DE GRAAF TAPES ARE READ AND NORMALIZED SUMS OF COUNTS COMPUTED FOR SETS OF CONSECUTIVE CHANNEL READINGS DENOTED BY PAIRS OF SPECIFIED CHANNEL NUMBERS IDENTIFYING THE INITIAL AND FINAL CHANNEL NUMBER FOR EACH SUM DESIRED.

GEO REFERENCES FILE CODES

1455 RE273

REQUESTOR R. BRITTAN REACTOR ENGINEERING

PROGRAMMER G. DUFFY

DETERMINE THE GAMMA DOSE RATE FROM A LEAKING PLUME OF FISSION PRODUCTS TAKING DEPOSITION, DECAY, AND WASHOUT INTO ACCOUNT.

704F REFERENCES FILE CODES D1

1456 BIM107 PARTITION THEORY-GRAIN COUNTING (MATRIX MULTIPLICATION)

REQUESTOR S. TYLER BIOLOGICAL AND MEDICAL RESEARCH

PROGRAMMER J. MILLER

ASSUMING THAT INITIALLY A SINGLE STRAND OF N CHROMOSOMES IN AN N-PAIR CHAIN IS LABELLED, COMPUTE P(K,J), THE PROBABILITY OF J LABELLED CHROMOSOMES AFTER K DIVISIONS.

704F REFERENCES FILE CODES APSB 0 F1

1458 PHY248 GIANT DIPOLE RESONANCE APPROXIMATION FOR NEUTRON RESONANCE RADIATION WIDTHS.

REQUESTOR R. CARPENTER PHYSICS

PROGRAMMER B. GARBOW

AVERAGED SUMS OF RANDOM VARIABLES DISTRIBUTED ACCORDING TO THE CHI-SQUARE DISTRIBUTION ARE GROUPED INTO A FREQUENCY DISTRIBUTION.

704F REFERENCES FILE CODES D1

1461 CHM152 LEAST SQUARES DETERMINATION OF SLATER PARAMETERS FROM OPTICAL SPECTRA

REQUESTOR M. FRED CHEMISTRY

PROGRAMMER J. GVILDYS

THIS PROGRAM PROVIDES LEAST SQUARES FITS OF SLATER PARAMETERS TO OBSERVED ATOMIC ENERGY LEVELS. BASICALLY THIS IS THE RECODED 498/CHM105 PROGRAM FOR THE 32K MEMORY WITH REVISED INPUT AND OUTPUT PROVISIONS.

704F REFERENCES FILE CODES E2

1462 IINSE ANALYSIS OF EBWR

REQUESTOR J. PAWLICKI INTERNATIONAL INSTITUTE

PROGRAMMERS L. BRYANT, L. JUST

ANALYSIS OF EBWR BEHAVIOR AFTER TURBINE TRIP.

ANA REFERENCES ANL6475 FILE CODES

1464 RE AMU-ANL HEAT TRANSFER PROGRAM

REQUESTOR D. HARDEN REACTOR ENGINEERING

CONSULTANT N. MOREHOUSE PROGRAMMER L. BRYANT

TEMPERATURE DROP THROUGH AN ELECTRICALLY HEATED TUBE WITH VARIABLE THERMAL CONDUCTIVITY AND ELECTRIC RESISTIVITY.

ANA REFERENCES FILE CODES

1465 PHY249 CALCULATION OF X(OR 9-J) COEFFICIENTS

REQUESTOR R. LANE PHYSICS

PROGRAMMER B. GARBOW

A FUNCTION OF RACAH COEFFICIENTS IS CALCULATED.

GEO REFERENCES 633/PHY145 FILE CODES Z0

1466 RPY133 DETERMINATION OF CONSTANTS RELATING TO EXCRETION RATES OF RA226 AND PB210 FROM THE HUMAN BODY

REQUESTOR R. HOLTZMAN RADIOLOGICAL PHYSICS

PROGRAMMER B. GARBOW

EXCRETION RATES ARE CALCULATED ACCORDING TO EITHER THE EXPONENTIAL OR POWER LAW FORMULA AS A FUNCTION OF CERTAIN PARAMETERS. THE INVERSE PROBLEM, THAT OF CHOOSING PARAMETERS THAT FIT BEST OBSERVED DATA, IS ALSO CONSIDERED.

704F REFERENCES FILE CODES D1,E2

1467 CEN107 ANALYSIS OF GAMMA SPECTRA

REQUESTOR W. SEEFELDT CHEMICAL ENGINEERING

PROGRAMMER R. SAKATA

DETERMINE BY A SIMPLE MATCHING PROCESS THE PROPORTION OF EACH OF EIGHT GIVEN REFERENCE SPECTRA THAT MAKE UP A GIVEN UNKNOWN SPECTRUM.

704F REFERENCES FILE CODES F4

1468 CHM153 AN X-RAY DIFFRACTION DATA REDUCTION PROGRAM (USNRL)

REQUESTOR E. SHERRY CHEMISTRY

PROGRAMMER J. GVILDYS

THIS PROGRAM IS INTENDED TO PROVIDE AN AUTOMATIC PROCESS FOR REDUCING (RAW) SINGLE-CRYSTAL X-RAY DIFFRACTION INTENSITY DATA TO THE FORM OF STRUCTURE FACTORS. THE REDUCTION MAY BE EXTENDED TO YIELD NORMALIZED STRUCTURE FACTORS. THE PROGRAM IS APPLICABLE PRIMARILY TO DATA OBTAINED ON FILM WITH WEISSENBERG AND/OR PRECESSION GONIOMETERS. THE PROGRAM DETECTS SOME ERRORS IN INTENSITY ESTIMATES AND INDEXING IN A PRELIMINARY ERROR-DETECTION RUN AND INDICATES THESE. THE TAPE OUTPUT IS CONSISTENT WITH THE INPUT OF STRUCTURE DETERMINATION AND REFINEMENT PROGRAMS.

704F REFERENCES FILE CODES MO

1470 RPY134 MULTI-CHANNEL ANALYZER DATA PROCESSING

REQUESTOR J. CORCORAN RADIOLOGICAL PHYSICS

PROGRAMMER S. ZAWADZKI

TO PROCESS TAPES FROM BOTH THE 256 AND 400 CHANNEL ANALYZERS--DIVIDING BY DURATION, SUBTRACTING BACKGROUND, SUMMING ELECTED GROUPS, AND PERFORMING SELECTED ARITHMETIC COMPUTATIONS. A PRESCRIBED OUTPUT FORMAT TO BE FURNISHED.

GEO REFERENCES FILE CODES

1473 BIM108 PARTITION THEORY-GRAIN COUNTING, GENERATING FUNCTION

REQUESTOR S. TYLER BIOLOGICAL AND MEDICAL RESEARCH

PROGRAMMER J. MILLER

DETERMINE THE COEFFICIENTS OF ALL POWERS OF T IN A GIVEN GENERATING FUNCTION G(N,T,K).

704F REFERENCES FILE CODES

1474 SSS131

REQUESTOR J. JACKSON SOLID STATE SCIENCE

PROGRAMMER R. SAKATA

CALCULATE THE CHANGE IN INITIAL THERMAL DEFECT CONCENTRATION DUE TO FINITE COOLING RATES IN METALS.

704F REFERENCES FILE CODES D2

1475 RPY135 ANALYSIS OF CONVECTIVE TURBULENCE PROJECT DATA

REQUESTOR J. CARSON RADIOLOGICAL PHYSICS

PROGRAMMER R. ROSICH

THIS PROGRAM PROCESSES TEMPERATURE AND WIND DATA FROM ATMOSPHERIC DIFFUSION STUDIES CARRIED OUT IN A WIND TUNNEL EXPERIMENT AT NYU. MULTIPLE EXPOSURE PHOTOGRAPHS ARE ANALYZED TO DETERMINE SMOKE PLUME CHARACTERISTICS UNDER VARIED WEATHER CONDITIONS.

704 REFERENCES FILE CODES E2

1476 RE274 SOLUTION OF DIFFERENTIAL EQUATIONS FOR AXISYMMETRIC FREE-CONVECTION HEAT TRANSFER ALONG A VERTICAL THIN CYLINDER

REQUESTOR R. VISKANTA REACTOR ENGINEERING

PROGRAMMER J. COOPER

DIFFERENTIAL EQUATIONS DESCRIBING THE AXISYMMETRIC FREE-CONVECTION HEAT TRANSFER FOR LAMINAR FLOW OF LIQUID METALS ALONG A VERTICAL THIN CYLINDER ARE TO BE SOLVED. ITERATION IS REQUIRED SINCE SUFFICIENT BOUNDARY CONDITIONS CANNOT BE SPECIFIED AT THE INITIAL POSITION VALUE.

704F REFERENCES FILE CODES D2

1477 AMD160 CHLOE OPERATIONS

REQUESTOR D. HODGES APPLIED MATHEMATICS

PROGRAMMERS D. HODGES, R. VONDEROHE, R. ROYSTON, A. OBROCK

1. PREPARATION AND TRANSLATION OF CODE TAPES TO AND FROM GEORGE TO CHLOE LANGUAGES.
2. USE OF GEORGE TO PLOT ON THE CRT, OUTPUT TAPES FROM CHLOE.

GEO REFERENCES FILE CODES

1481 PHY250 PREPROCESSING OF DATA FOR PHY237

REQUESTOR R. RINGO PHYSICS

CONSULTANT J. BUTLER PROGRAMMER R. ROSICH

GIVEN IS AN INPUT TAPE FOR PHY 237 CONTAINING A KNOWN NUNBER OF PATTERNS IN EACH OF THREE CATEGORIES. ALSO GIVEN IS A SMALLER NUMBER OF STANDARD PATTERNS IN EACH CATEGORY. THE PROBLEM CONSISTS OF REJECTING ALL PATTERNS ON THE LONGER TAPE WHICH HAVE A HAMMING DISTANCE SMALLER THAN A GIVEN INTEGER FROM ANY OF THE STANDARD PATTERNS. THE OUTPUT TAPE SHOULD AGAIN BE IN THE PROPER FORMAT FOR INPUT TO PHY237.

GEO REFERENCES FILE CODES T1

1482 MET143

REQUESTOR L. LLOYD METALLURGY

PROGRAMMER L. BUSH

THIS PROGRAM CALCULATES VARIOUS RELATIONSHIPS OF CRYSTAL GEOMETRY FOR ALL OF THE SEVEN CRYSTAL SYSTEMS. INTER-PLANAR SPACING, AREA OF THE UNIT PARALLELOGRAM FOR A LATTICE PLANE, AND THE SHORTEST DISTANCE BETWEEN IDENTICAL POINTS ALONG A LATTICE DIRECTION CAN BE CALCULATED FOR PERMUTATIONS OF MILLER INDICES WHOSE ABSOLUTE VALUES ARE LESS THAN OR EQUAL TO 22. ALSO, THE PROGRAM CALCULATES THE ANGLE BETWEEN THE PLANE, OR DIRECTION, WHOSE INDICES ARE PERMUTATED AND THE CORRESPONDING PRINCIPAL CRYSTAL ELEMENTS. INDICES WHICH PRODUCE REDUNDANT RESULTS ARE OMITTED FROM THE OUTPUT.

704F REFERENCES ANL6592 FILE CODES Z0

1484 PHY251

REQUESTOR R. LAWSON PHYSICS

PROGRAMMER B. GARBOW

GIVEN A SET OF 3X3 SYMMETRIC MATRICES AND THE EIGENVALUES OF A CERTAIN UNKNOWN LINEAR COMBINATION OF THEM, THE PROGRAM DETERMINES THE COEFFICIENTS OF THIS LINEAR COMBINATION IF THEY EXIST, OR INSTEAD THE BEST EXISTING APPROXIMATE.

704F REFERENCES FILE CODES C4, F2

1488 CHM154

REQUESTOR M. SCHIFFER CHEMISTRY

PROGRAMMER L. BUSH

THIS IS AN ITERATIVE LEAST SQUARES PROGRAM TO PRODUCE CALIBRATION FACTORS FOR DENSITY MEASUREMENTS OF DIFFRACTION PATTERNS ON DIFFERENT PHOTOGRAPHIC PLATES. THE OUTPUT FORMAT IS TO BE SUITABLE FOR INPUT TO CHM119 AND MET133.

704F REFERENCES FILE CODES EZ

1489 PHY254

REQUESTOR J. WEINMAN PHYSICS

PROGRAMMER R. ROSICH

AN ANALYSIS OF SMEARING OF RESONANCE SHAPES IN ELASTIC SCATTERING PROBLEMS AS DETERMINED BY THE TARGET THICKNESS.

704F REFERENCES FILE CODES ZO

1490 CHM155 LEAST SQUARES FITTING OF RADIOACTIVE DECAY DATA.

REQUESTOR E. STEINBERG CHEMISTRY

PROGRAMMER J. GVILDYS

THIS PROGRAM IS INTENDED TO PROVIDE LEAST SQUARES FITTING OF RADIOACTIVE DECAY DATA USING THE VARIABLE METRIC METHOD FOR MINIMIZATION.

704F REFERENCES ANZ013 FILE CODES E2

1491 MET144

REQUESTOR M. MUELLER METALLURGY

PROGRAMMER J. GVILDYS

FOR A GIVEN SET OF DATA THIS PROGRAM SQUARES ONE OF THE VARIABLES AND ADDS THE DATA ACCORDING TO SPECIFIED GROUPS.

704F REFERENCES FILE CODES ZO

PROGRAMMING SYSTEMS AND LIBRARY ROUTINES

Abstracts of 704 Newsletters

The 704 Newsletter is published at irregular intervals and contains information of interest to users of the IBM 704 and its related equipment. This information includes abstracts of SHARE correspondence and titles and subject classification of routines distributed by the SHARE Distribution Agency.

704 Newsletter No. 18 10/2/61

New 7090 FORTRAN Documentation Announced by IBM as available.

Peripheral Computer Committee (including IBM 1401) Announcements, as presented at SHARE XVII meeting. Discussion includes standards agreed upon, new equipment made available, routines completed or in process, and future plans of the committee.

Extended Character Set (61 characters) adapted by SHARE for use with the 1403 printer.

SHARE XVII plans regarding ALGOL, Teaching Machines, Multiple Activity Projects Scheduling, Disk Files, Machine Translation, and 7090 RPQ's discussed.

Imminent arrival (12/62) of a Paper Tape Reader for the 1401 (RPQE95528) announced. Brief description of operation and use provided.

To increase accuracy of data transmission, symbols recommended by the Digital Operations Group are listed and defined.

Four additional sense switches added to AMD's 1401 control panel.

1401 Abstracts published by IBM and available in AMD.

New edition of SHARE Abstracts scheduled for distribution in October.

Recent SHARE Correspondence

Recent SHARE Distributions

704 Newsletter No. 19 6/9/62

Recent SHARE Correspondence

Recent SHARE Distributions

Abstracts of GEORGE Bulletins

The GEORGE Bulletin is published at irregular intervals and contains current information and news of interest to users of GEORGE and its related equipment. Following is a list of the topics discussed in Bulletins published during this period.

GEORGE Bulletin No. 14 — 11/6/61

Addition to the function of the $\overline{E4}$ symbol (GEORGE Character Code 3C).

Availability of Narrow Magnetic Tape Input Unit is announced.

GEORGE Subroutine library now accessible from Narrow Magnetic Tape via Subroutine Loader Routine (X-30-280).

Announcement of series of information sessions on the ALGOL language.

GEORGE Bulletin No. 15 — 3/13/62

Announcement of GEORGE Assembly Program III (GAR III) and GAR III Description.

Detailed description of GENERAL INPUT ROUTINE B-26-281 and GENERAL OUTPUT ROUTINE B-21-263 used in conjunction with GAR III pseudo orders.

Attached index of topics described in GEORGE Bulletins.

Subroutine Additions for the IBM 704

NUMBER	TITLE	REMARKS
C307	Coulomb Function Subroutine	
C308	A Subroutine for Evaluating Clebesch-Gordon Coefficients	
C309	A Subroutine for Calculating Associated Legendre Functions	
C310	Coulomb Phase Shift	
E209	A General Program for Least Square Polynomial Fit	Share Dist. 1264
E210	Chebyshev Line Fit	Share Dist. 1265
E211	Least Square n-Dimensional Square Fit	
F202	Eigenvalues and Eigenvectors of a Real Symmetric Matrix (FORTRAN II) (Revised)	Share Dist. 664
I113	1401 Row Binary Input/Output (Revised)	Share Dist. 1112
I114	Card to Tape or Printer with a Board Simulator to Move or Split Columns, 1401	
I115	Sense Switch Controlled Peripheral Equipment Simulator, 1401	
I116	Paper Tape Input Routine for RPQE95528 on 1401	
L004	1401 Library Tape Handler	
L201	FORTRAN Preprocessor, DDT, 4K 1401	1401 Library 13.2.002
M101	Algebraic Sort	
P012	Tape Testing Routine	
Q202	Checksum Corrector and Row to Column or Column to Row Converter	
Q003	GAR Source Code, Card to Magnetic Tape	

GEORGE Subroutine Additions

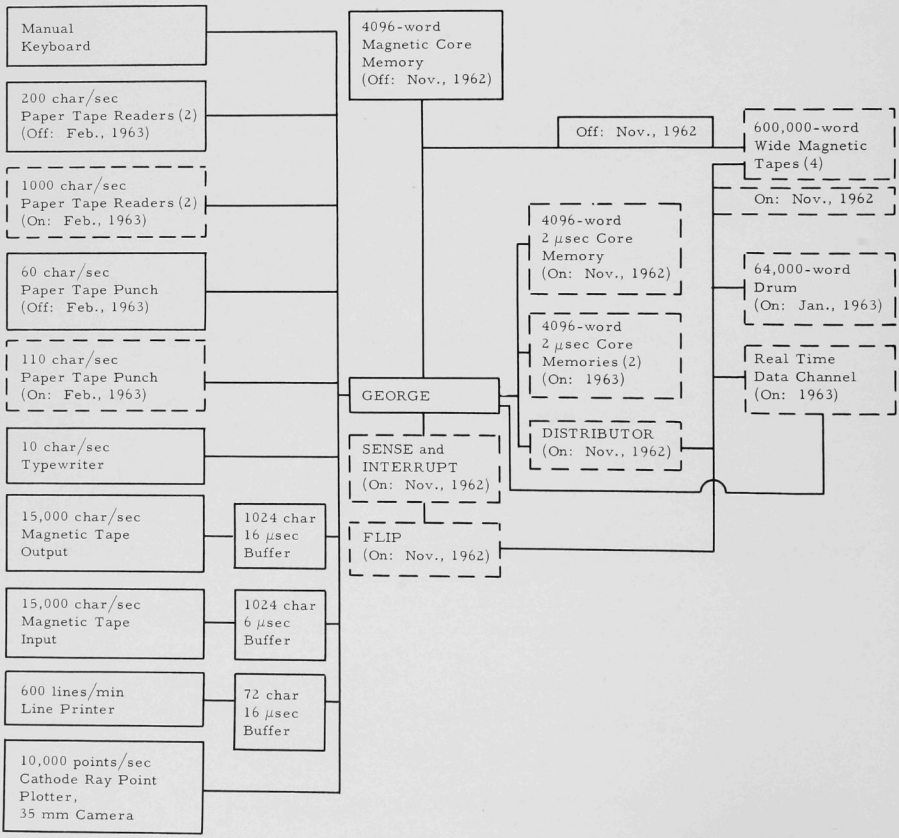
NUMBER	TITLE
X-28-276	Wide Magnetic Tape Sexadecimal Dump
X-29-279	Anelex Printout of Paper Tape
X-30-280	Narrow Tape Library Subroutine Loader

COMPUTER ENGINEERING AND EQUIPMENT

The present effort is directed toward (a) the completion of the GEORGE-FLIP Computer system and (b) the development of information retrieval and pattern recognition systems.

The GEORGE computer, which commenced full-time operation in November 1957, has been a contribution to computer technology as well as a useful tool for the Laboratory. GEORGE is a 40-binary-digit, parallel, asynchronous, modified two-address, fixed-point machine. A floating-point arithmetic unit (FLIP) which performs significance arithmetic is under construction for operation with GEORGE. The complete GEORGE-FLIP system with approximate dates for completion of the various units is given below.

Planned GEORGE-FLIP System



An automatic data-processing system, known as CHLOE, for analyzing spark-chamber photographs is under development. It utilizes a fiber optics cathode-ray-tube scanner and an ASI-210 digital computer.

The computing equipment described below is currently available in the Applied Mathematics Division for carrying out computations.

1) An IBM-704 digital computer equipped with:

a 32768-word magnetic core memory,
an 8192-word magnetic drum memory, and
9 on-line magnetic tape units.

2) An IBM-1401 System consisting of:

a type 1401 Model C3 (4000-character Storage) Central Processing Unit with:

multiply-divide
print storage
column binary
high-low-equal compare
advanced programming
buffered paper tape input
read-punch release
additional print control and print storage
10 sense switches
space suppress

a type 1402 Model 1 Card Read Punch (800 cards/min),
a type 1403 Model 2 Printer (600 lines/min), and
2 type 729 Model II Tape Drives

3) The Laboratory-designed and -built digital computer GEORGE, equipped with:

a 4096-word magnetic core memory,
paper tape input and output,
4 wide magnetic tape units for internal memory storage,
an ANELEX buffered, 72 char/line, on-line printer (600 lines/min),
a buffered (1024 char) narrow magnetic tape output unit,
a buffered (1024 char, max record; 512 char) narrow magnetic tape input unit, and
a cathode ray tube output recorder and camera.

4) A PACE analog computer, consisting of two computing consoles (which can be coupled) each complete with:

28 integrating amplifiers,
28 summing amplifiers,

10 servo mechanisms,
5 electronic multipliers,
5 diode function generators, and
80 scale factor potentiometers.

5) An Electronic Associates graph plotter operated from paper tape, punched card, or manual input.

6) A paper tape to punched card converter designed to make GEORGE output compatible with the 704 installation.

PUBLICATIONS AND PAPERS

PUBLICATIONS

1) KENNETH SMITH AND P. G. BURKE(1), EFFECT OF VIRTUAL EXCITATIONS ON THE ELASTIC SCATTERING OF ELECTRONS AND POSITRONS BY ATOMIC HYDROGEN, PHYS. REV., VOL.123, NO.1 (JULY 1, 1961) PP.174-178.

2) C. N. KELBER(2), L. C. JUST, AND N. F. MOREHOUSE, JR., THE SOLUTION OF MANY REGION REACTOR KINETICS PROBLEMS ON AN ANALOG COMPUTER, NUCLEAR SCIENCE AND ENGINEERING, VOL.11, NO.3 (NOVEMBER, 1961) PP.285-289.

3) KENNETH SMITH, PARTIAL WAVE THEORY OF POSITRON-HYDROGEN ATOM COLLISIONS, PROCEEDINGS OF THE PHYSICAL SOCIETY, VOL.LXXVIII (1961) PP.549-553.

4) DAVID L. PHILLIPS, A TECHNIQUE FOR THE NUMERICAL SOLUTION OF CERTAIN INTEGRAL EQUATIONS OF THE FIRST KIND, JOURNAL OF THE ASSOCIATION FOR COMPUTING MACHINERY, VOL.9, NO.1 (JANUARY, 1962) PP.84-97.

5) ALBERT J. HATCH(3) AND J. W. BUTLER, EXPERIMENTAL ANALOG STUDY OF EQUILIBRIUM OF DENSE PLASMA CORES, JOURNAL OF ELECTRONICS AND CONTROL, VOL.12, NO.2 (FEBRUARY, 1962) P.89.

6) KENNETH SMITH, ROBERT P. MCEACHRAN(4), AND PETER A. FRASER(4), EFFECT OF VIRTUAL EXCITATION OF THE 2S STATE ON THE ELASTIC SCATTERING OF ELECTRONS BY ATOMIC HYDROGEN, THE PHYSICAL REVIEW, VOL.125, NO.2 (JANUARY, 1962) PP.553-558.

7) FORREST SALTER, BASIC LOGIC NOR MODIFIED FOR 10 MC, TWO-PHASE CLOCK, ELECTRONIC DESIGN (JANUARY, 1962).

8) HARVEY COHN, A NUMERICAL STUDY OF THE RELATIVE CLASS NUMBERS OF REAL QUADRATIC INTEGRAL DOMAINS, MATHEMATICS OF COMPUTATION, VOL.16, NO.78 (APRIL, 1962) PP.127-140.

9) W. F. MILLER AND WILLIAM J. SNOW, NAI AND CSI EFFICIENCIES AND PHOTOFRACTIONS FOR GAMMA-RAY DETECTION, NUCLEONICS (REFERENCE DATA MANUAL) (NOVEMBER, 1961) PP.174-175.

10) B. E. RHOADES, SOME TOTALLY EQUIVALENT MATRICES, AMERICAN MATHEMATICAL MONTHLY, VOL.69 (JUNE-JULY, 1962) PP.523-524.

11) ROBERT N. BUCHAL, THE APPROACH TO STEADY STATE OF SOLUTIONS OF EXTERIOR BOUNDARY VALUE PROBLEMS FOR THE WAVE EQUATION, JOUR. MATH. AND MECH. (IN PRESS).

12) N. J. DEBRUIJN(5) AND HERBERT S. WILF, ON HILBERT'S INEQUALITY IN N DIMENSIONS, BULLETIN OF THE AMS (RESEARCH NOTICE), VOL.68, NO.2 (MARCH, 1962) PP.70-73.

13) W. R. COWELL, THE USE OF GROUP CODES IN ERROR DETECTION AND MESSAGE RETRANSMISSION, IRE TRANSACTIONS ON INFORMATION THEORY, VOL. IT-7 (JULY, 1961).

14) W. R. COWELL AND H. O. BURTON(6), COMPUTER SIMULATION OF THE USE OF GROUP CODES WITH RETRANSMISSION ON A GILBERT BURST CHANNEL, COMMUNICATION AND ELECTRONICS (AIEE) (JANUARY, 1962).

15) J. M. CHAUMONT(2A) AND J. A. KOERNER, A TWO-DIMENSIONAL PERTURBATION CODE AND ITS APPLICATION TO REACTIVITY COEFFICIENTS IN THE EXPERIMENTAL BREEDER REACTOR II, TRANS. AM. NUCLEAR SOC. 5 (1) 95 (JUNE, 1962).

16) KENNETH SMITH AND P. G. BURKE(1), THE LOW ENERGY SCATTERING OF ELECTRONS AND POSITRONS BY ATOMIC HYDROGEN, REVS. MOD. PHYS., (JULY, 1962).

17) R. O. LANE(3) AND W. F. MILLER, ENERGY-DEPENDENT MULTIPLE SCATTERING OF NEUTRONS IN THIN PLATES, NUCLEAR INSTRUMENTS AND METHODS, VOL.16, NO.1 (1962).

18) B. E. RHOADES, TOTAL COMPARISON AMONG SOME TOTALLY REGULAR HAUSDORFF MATRICES - ADDENDUM, MATH. ZEIT. (IN PRESS).

19) G. F. BASSANI(7), AND MEGUMU YOSHIMINE, ELECTRONIC-ENERGY BANDS OF GROUP IV ELEMENTS AND THE III-V COMPOUNDS, ABSTRACT IN BULL. AM. PHYS. SOC. 7, 410 (JUNE, 1962).

20) W. J. CODY, J. LAWSON(8), H. S. W. MASSEY(8), AND KENNETH SMITH, THE ELASTIC SCATTERING OF POSITRONS BY ATOMIC HYDROGEN, PROC. ROY. SOC. (IN PRESS).

21) P. G. BURKE(1), H. M. SCHEY(1), AND KENNETH SMITH, THE INELASTIC SCATTERING OF ELECTRONS BY ATOMIC HYDROGEN (SUBMITTED TO PHYS. REV.).

22) C. S. DEERING(9) AND C. B. SHELMAN, AN INCREMENTAL COMPUTER TECHNIQUE FOR SOLVING COORDINATE-ROTATION EQUATIONS, IRE TRANSACTIONS ON ELECTRONIC COMPUTERS, VOL.EC-10, (DECEMBER, 1961), NO.4.

(1) LAWRENCE RADIATION LABORATORY, UNIVERSITY OF CALIFORNIA, BERKELEY, CALIF.
(2) REACTOR ENGINEERING DIVISION
(2A) REACTOR ENGINEERING DIVISION, ON LEAVE FROM COMMISSARIAT A L ENERGIE ATOMIQUE, PARIS, FRANCE
(3) PHYSICS DIVISION
(4) DEPARTMENT OF PHYSICS, UNIVERSITY OF WESTERN ONTARIO, LONDON, CANADA
(5) TECHNISCHE HOGESCHOOL, EINDHOVEN
(6) BELL TELEPHONE LABORATORIES, INC., MURRAY HILL, N. J.
(7) SOLID STATE SCIENCE DIVISION
(8) UNIVERSITY COLLEGE, LONDON
(9) LANG-TENCO-BOUGH, INC., DALLAS, TEXAS

ANL REPORTS

1) ANL-6442, COST FUNCTION STUDIES FOR POWER REACTORS, BY J. HEESTAND AND L. WOS.

2) ANL-6447, GAMMA I - A GENERAL THEOREM-PROVING PROGRAM FOR THE IBM 704, BY JOHN ALAN ROBINSON.

3) ANL-6453, APPLIED MATHEMATICS DIVISION SUMMARY REPORT, JULY 1, 1960 THROUGH JUNE 30, 1961.

4) ANL-6456, ELEMENTARY DIVISORS AND SOME PROPERTIES OF THE LYAPUNOV MAPPING $X \rightarrow AX+XA^*$, BY J. W. GIVENS.

5) ANL-6459, TRANSPORT SOLUTIONS TO THE ONE-DIMENSIONAL CRITICAL PROBLEM, BY GEORGE J. MITSIS.

6) ANL-6482, AN ANALOG COMPUTER MODEL OF A MULTIPLE REGION REACTOR, BY L. C. JUST, C. N. KELBER*, AND N. F. MOREHOUSE, JR.

7) ANL-6484, STABILITY ANALYSIS OF EBR-II, BY H. H. HUMMEL* AND L. T. BRYANT.

8) ANL-6499, THE MEASUREMENT OF ENERGY AND INTENSITY OF GAMMA RAYS BY USE OF A SCINTILLATION SPECTROMETER, BY R. T. JULKE, J. E. MONAHAN**, S. RABOY**, AND C. C. TRAIL**.

9) ANL-6555, 2D PERT, A TWO-DIMENSIONAL PERTURBATION CODE, BY J. M. CHAUMONT*** AND J. A. KOERNER.

* REACTOR ENGINEERING DIVISION
** PHYSICS DIVISION
*** REACTOR ENGINEERING DIVISION, ON LEAVE FROM COMMISSARIAT A L ENERGIE ATOMIQUE, PARIS, FRANCE.

AMD TECHNICAL MEMORANDA

1) NO. 16, TABULATION OF G-COEFFICIENTS, BY DONALD F. JORDAN AND KENNETH SMITH.

2) NO. 18, AN INTRODUCTION TO THE TRANSPORTATION METHOD, BY VITTORIO BARRILE.

3) NO. 23, GAMMA I - A GENERAL THEOREM-PROVING PROGRAM FOR THE IBM-704, BY JOHN A. ROBINSON.

4) NO. 24, ANL BUBBLE CHAMBER AND SPARK CHAMBER DATA HANDLING SYSTEM, BY J. BUTLER AND D. HODGES.

5) NO. 26, THE NOR CIRCUIT AND SOME OF ITS APPLICATIONS, BY F. O. SALTER.

6) NO. 27, THE APPROACH TO STEADY STATE OF SOLUTIONS OF EXTERIOR BOUNDARY VALUE PROBLEMS FOR THE WAVE EQUATION, BY R. BUCHAL.

7) NO. 28, PATTERN RECOGNITION USING CORRELATION AND LEARNING, BY CECIL B. SHELMAN.

8) NO. 29, ANL GEORGE COMPUTER NARROW MAGNETIC TAPE INPUT SYSTEM, BY R. ASCHENBRENNER.

9) NO. 30, GENERATION AND TESTING OF RANDOM NUMBERS ON AVIDAC, BY WILLIAM J. SNOW AND WILLIAM F. MILLER.

10) NO. 31, 1401 PAPER TAPE READER, AMD INFORMATION MANUAL, BY GEORGE A. ROBINSON.

11) NO. 32, USE OF ELECTRONIC ASSOCIATES DATAPLOTTER, BY RICHARD KING AND STANLEY ZAWADZKI.

PAPERS PRESENTED AT MEETINGS

1) EXPERIMENTAL ANALOG STUDY OF EQUILIBRIUM OF DENSE PLASMA CORES, BY ALBERT J. HATCH* AND J. W. BUTLER, IAEF CONF. ON PLASMA PHYSICS AND CONTROLLED FUSION, SALZBURG, AUSTRIA, SEPTEMBER, 1961.

2) TOTAL RELATIVE STRENGTH OF A HAUSDORFF METHOD, BY B. E. RHOADES, SUMMER MEETING OF THE AMERICAN MATHEMATICAL SOCIETY, STILLWATER, OKLAHOMA, AUGUST 29, 1961.

3) STABILITY ANALYSIS OF EBR-II, BY H. H. HUMMEL** AND L. T. BRYANT, SEMINAR ON THE PHYSICS OF FAST AND INTERMEDIATE REACTORS, VIENNA, AUGUST, 1961.

4) AN ACCURATE TREATMENT OF RESONANCE SCATTERING IN LIGHT ELEMENTS IN FAST REACTORS, BY H. H. HUMMEL** AND A. L. RAGO, IAEA SEMINAR ON THE PHYSICS OF FAST AND INTERMEDIATE REACTORS, VIENNA, AUGUST 3-11, 1961. ABSTRACT (SM-18/45) IN PHYSICS OF FAST AND INTERMEDIATE REACTORS.

MEETING REPORTS

1) REPORT ON SECOND BIONICS CONFERENCE, BY D. HODGES AND E. TRUCCO***, SYMPOSIUM AUGUST 30-SEPTEMBER 1, 1961, AT CORNELL UNIVERSITY, ITHACA, N. Y.

* PHYSICS DIVISION
** REACTOR ENGINEERING DIVISION
*** BIOLOGICAL AND MEDICAL RESEARCH DIVISION

SEMINARS, LECTURES, AND COURSES

Applied Mathematics Seminars

July 6, 1961	"Mechanizing the Discovery of Proofs in Formalized Mathematical Theories, Part II," by Professor John Alan Robinson, University of Pittsburgh, Pittsburgh, Pennsylvania and Rice University, Houston, Texas.
July 13, 1961	"Class Number Calculations, Past and Present, Part I," by Professor Harvey Cohn, University of Arizona, Tucson, Arizona.
July 20, 1961	"Class Number Calculations, Past and Present, Part II," by Professor Harvey Cohn, University of Arizona, Tucson, Arizona.
July 27, 1961	"Digital Approximation of Differential Equations Using Trapezoidal Convolutions - Part I," by Professor Charles A. Halijak, Kansas State University, Manhattan, Kansas.
August 3, 1961	"Digital Approximation of Differential Equations Using Trapezoidal Convolutions - Part II," by Professor Charles A. Halijak, Kansas State University, Manhattan, Kansas.
August 10, 1961	"Generalization of the Krein-Milman Theorem," by Professor Ky Fan, Northwestern University, Evanston, Illinois.
August 17, 1961	"Class Number Calculations, Past and Present, Part III," by Professor Harvey Cohn, University of Arizona, Tucson, Arizona.
August 26, 1961	"Recent Work in Transport Theory," by Professor Garrett Birkhoff, Department of Mathematics, Harvard University, Cambridge, Massachusetts.
August 29, 1961	"Statistical Mechanics of One Dimensional Systems," by Professor Mark Kac, Department of Mathematics, Cornell University, Ithaca, New York.
September 14, 1961	"Elementary Divisors and Some Properties of Lyapunov Matrices," by Professor Wallace Givens, Department of Engineering Sciences, Northwestern University, Evanston, Illinois.

September 28, 1961	"Difference - Integral Equations," by Dr. Philip M. Anselone, Mathematics Research Center, University of Wisconsin, Madison, Wisconsin.
October 12, 1961	"Computing Eigenvalues: The State of the Art - Part I," by Professor Wallace Givens, Engineering Sciences Department, Northwestern University, Evanston, Illinois.
October 19, 1961	"Computing Eigenvalues: The State of the Art - Part II," by Professor Wallace Givens, Engineering Sciences Department, Northwestern University, Evanston, Illinois.
October 23, 1961	"Theory of Stochastic Population Processes," by Professor J. E. Moyal, Institute for Advanced Studies, Australian National University, Canberra, A. C. T., Australia.
October 27, 1961	"The Present and Future of the ALGOL Effort," by Professor Peter Naur, Department of Numerical Analysis, Regnecentralen, Copenhagen, Denmark, and University of North Carolina.
November 9, 1961	"Application of Tunnel and Varactor Diodes," by Dr. Davis, Manager, Microwave Products, Texas Instruments, Dallas, Texas.
November 10, 1961	"Information Retrieval," by I. A. Warheit, IBM Corporation, San Jose, California. (Joint AMD-TIN Seminar)
November 30, 1961	"On a Class of Singular Integral Equations," by Professor Hans F. Bueckner, Mathematics Research Center, U. S. Army, University of Wisconsin, Madison, Wisconsin.
December 14, 1961	"Executive Systems, Past, Present, Future," by Professor Bernard A. Galler, Computing Center, University of Michigan, Ann Arbor, Michigan.
December 21, 1961	"Pattern Recognition," by James W. Butler, Applied Mathematics Division, Argonne National Laboratory.
December 28, 1961	"Diffraction of Electromagnetic Waves," by Professor Calvin H. Wilcox, University of Wisconsin, Madison, Wisconsin.
January 4, 1962	"Survey of Information Theory," by Dr. Wayne Cowell, Applied Mathematics Division, Argonne National Laboratory.

January 29, 1962	"Lattice Theory and Its Applications," by Professor Garrett Birkhoff, Department of Mathematics, Harvard University, Cambridge, Massachusetts.
January 30, 1962	"Vector Lattices," by Professor Garrett Birkhoff, Department of Mathematics, Harvard University, Cambridge, Massachusetts.
February 15, 1962	"Experiments in the Numerical Evaluation of Certain Wiener Integrals," by Professor L. D. Fosdick, Digital Computer Laboratory, University of Illinois, Urbana, Illinois.
March 1, 1962	"On Iterative Circuit Computers," by Professor John Holland, Communication Sciences, University of Michigan, Ann Arbor, Michigan.
March 2, 1962	"Cybernetics in the USSR," by Dr. Stephen Aldrich and Mr. John Ford, U. S. Government Control Sciences Group, Washington, D. C. (Joint BIM-AMD Seminar).
March 22, 1962	"A General Description of a Computer - Oriented Bubble Chamber Data Processing System," by Professor James N. Snyder, Digital Computer Laboratory, University of Illinois, Urbana, Illinois.
April 5, 1962	"Distribution Theory," by Professor Bernard Friedman, Chairman, Department of Mathematics, University of California, Berkeley, California.
April 12, 1962	"The Evolution of the General Problem Solver," by Professor Allen Newell, Systems and Communications Sciences, Department of Electrical Engineering, Carnegie Institute of Technology, Pittsburgh, Pa.
April 20, 1962	"A New Method of Finding Zeros of Polynomials," by Professor and Mrs. D. H. Lehmer, University of California, Berkeley, California.
April 26, 1962	"Various Applications of Lyapunov's Direct Method," by Professor W. Hahn, Technische Hochschule, Braunschweig, West Germany.
May 4, 1962	"Survey of Computer Applications in Biology and Medicine," by Dr. George A. Sacher, Biological and Medical Research Division, Argonne National Laboratory.

May 11, 1962	"Integration of Functionals," by Professor Thomas Seidman, University of Wisconsin, Madison, Wisconsin.
May 24, 1962	"The Construction of a Compiler," by Professor Harry D. Huskey, Department of Electrical Engineering, University of California, Berkeley, California, and President of the Association for Computing Machinery.
June 14, 1962	"Linear Programming," by Professor Abraham Charnes, Mathematics Department, Northwestern University, Evanston, Illinois
June 27, 1962	"Error Analysis of Matrix Processes," by J. H. Wilkinson, National Physical Laboratory, Teddington, Middlesex, England.

Special Interest Seminars

November 10, 1961	"Techniques of Machine Translator Construction," by Robert Floyd, Armour Research Foundation, IIT, Chicago, Illinois
June 7, 1962	"The Mathematical Foundations of Quantum Field Theory," by Professor David Shale, Department of Mathematics, University of California, Berkeley, California.

Lectures Presented at Meetings

"Electronic Computers," presented to Glen Ellyn Junior High School Math Class, by Forrest Salter, January 25, 1962.

"Computers in the Nuclear Sciences: Past, Present, Future," presented at the meeting of the Chicago Chapter of the Armed Forces Communication & Electronics Association, Wheaton, Illinois, February 22, 1962, by W. F. Miller.

"Stochastic Techniques and Their Application in Nuclear Chemistry," presented at Kent State University, Kent, Ohio, March 29, 1962, by W. F. Miller.

"Why Teach Mathematics?" at meeting of Illinois Council of Teachers of Mathematics, Western Illinois University, Macomb, Illinois, April 7, 1962, by J. W. Butler.

"Cybernetics," presented to 417th Civil Affairs Company, USAR, Jackson Park Armory, Chicago, Illinois, May 7, 1962, by A. L. Rago.

"Zeros of Polynomials and the Resultant Procedure," presented at the University of Toronto, Canada, March 14, 1962, by E. H. Bareiss.

"Non-linear Systems of Partial Differential Equations in Diffusion Kinetics," presented at the University of Toronto, Canada, March 15, 1962, by E. H. Bareiss.

"Zeros of Polynomials and the Resultant Procedure," presented at Iowa State University, Ames, Iowa, May 15, 1962, by E. H. Bareiss.

"Low Energy Scattering of Electrons and Positrons by Atomic Hydrogen," presented at Queen's University of Belfast, October 24, 1961, by Kenneth Smith.

"Calculations of Cross Sections in Wave Mechanics," presented at Stuttgart Technische Hoschschule, November, 1961, by Kenneth Smith.

"(D, P) Reactions in the Strong Coupling Approximation," presented at Universitat der Marburg, November, 1961, by Kenneth Smith.

"The Applied Mathematician in the National Laboratories," presented to the Junior and Senior math students at Elmhurst College, March 6, 1962, by W. J. Cody.

"The Martin-Schwinger Theory of Many-Body Systems," by Dr. John C. Reynolds, a series of six lectures given in conjunction with the Physics Division, August, 1961.

"An Introduction to Programming of Digital Computers," by Nancy Clark, a series of six lectures presented at Rosary College, River Forest, Illinois, October and November, 1961.

Courses in Applied Mathematics, Numerical Analysis, and Programming

704 FORTRAN - $4\frac{1}{2}$ hours per week, from June 19 to July 6, 1961

Instructor - Norbert J. Purcell

Contents - FORTRAN language programming for the IBM 704

Numerical Analysis - bi-weekly 1 hour sessions, from February 19 to May 28, 1962

Instructor - W. J. Cody

Contents - Basic course, using text of Kunz, Numerical Analysis (McGraw-Hill).

COMPUTER SERVICES COUNCIL

The Computer Services Council met once during the report period - on September 22, 1961. Plans of the Applied Mathematics Division to expand physical facilities and computing capacity were discussed. A detailed comparison of several of the current and proposed large-scale digital data processing systems was made.